

# Gender Stereotypes in the Classroom and Effects on Achievement

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- Gender stereotyped beliefs, rigid characterizations of gender roles, are pervasive: in family, schools, professional and social life.
- Women's role, men's role in the society, what is expected from them, what women are/aren't capable of, what men are/aren't capable of etc.
- Gender roles are established in children's minds very early on. Raven and Rubin (1983)
- Question: What is the impact of these beliefs?

# What is the impact of gender stereotyped beliefs?

- Impact on individual's
  - Beliefs and attitudes (gender attitudes)
  - Behavior
  - Preferences
- Impact on actual choices outcomes (academic outcomes, occupational outcomes etc): Francis and Skelton (2005) and Wessel (2005).

# Family matters: Intergenerational Transmission

- Family is perhaps the most important environment for transmission of beliefs, attitudes and preferences of adults to children.
  - Dohmen et al. (2012), Alan et al. (2014), Farreí and Vella(2007), Bisin and Verdier (2000).
- SES/education/culture/religion determine how progressive/regressive gender roles are defined in family
- Our focus is the classroom, in particular, teacher.

- The teacher becomes a very important adult in a child's life starting school and her gender role beliefs may affect
  - Student's beliefs (indoctrination, role models)
  - Student's outcomes
    - differential interactions, classroom practices
    - influence on non-cognitive skills
- No evidence on the impact of teacher's gender roles attitudes/beliefs on student achievement.
- Effect of gender/race of teacher on achievement (stereotype threat). Spencer et al (1999), Thomas Dee (2005), Muralidharan (2016). These are not looking at teacher's beliefs.

# Teacher's Beliefs and Student's Beliefs



# What do we do?

- We
  - ① show evidence of transmission of gender role beliefs from teachers to elementary school children.
  - ② show the effect of teacher's beliefs on actual outcomes: test scores (math and verbal) and more (occupational aspirations)
  - ③ set out to understand the mechanisms through which teacher's beliefs influence actual achievement outcomes.

# Potential Problems

- ① Non-random assignment of students to classrooms (teachers).
    - A particular type family choosing a particular school and teacher.
  - ② Non-random assignment of teachers to schools.
    - A particular teacher self-select into a particular school.
- (1) and/or (2) may generate a positive correlation between teacher's beliefs and student's beliefs.



- We exploit two main features of Turkish public education system
  - Random allocation of students (grade 1) into classroom in a given catchment area school
    - Ruling out parents choosing a particular teacher
    - Classroom re-mixing extremely rare.
  - Near-random allocation of teachers to schools
    - Ruling out teachers choosing a particular school or a catchment area, conditional on district
  - Variation in length of exposure to the same teacher: as short as 1, as long as 4 years.

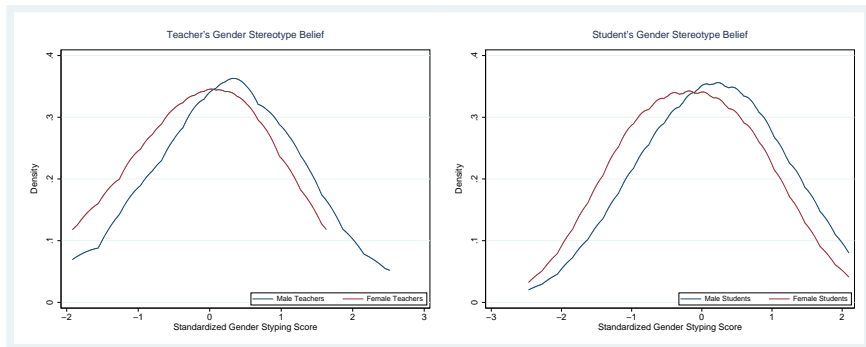
# Data: A Large-Scale Field Study in Istanbul

- A large data collection effort launched in Spring 2015 and Fall 2015.
  - A rich set of information on about 4000 students (3. and 4. grade) and 145 teachers.
    - Student surveys (behaviors and attitudes, home environment)
    - Test scores (standardized math and Turkish language)
    - Teachers assessment surveys (teacher's assessment on pupil's attitude and academic standing)
    - Cognitive ability test (Raven's Progressive Matrices)
    - Teacher surveys (behaviors, attitudes, qualifications, teaching styles, demographics)

# Gender Stereotype Score

- Includes 9 items with 4 point likert scale range : strongly disagree to strongly agree
- Items include statements such as:
  - Men have better judgment compare to women, hence they are better leaders.
  - Men are better at maths than women.
- Factor analysis: standardized sum scores

# Distribution of Beliefs



# Teacher Characteristics and Qualifications

- Very important to account for teacher ability, gender role belief likely proxy teacher quality.
- We have all paper qualifications, study majors
- Experience, tenure.

- Most of the variation in teacher quality likely to be attributable to unobserved factors. Qualifications on paper have little impact. Aaronson et al (2007), Rivkin et al (2005).
- Also important is to control for teaching styles. Styles (modern, traditional etc) seem to matter for achievement outcomes. Slavin et al (2009), Schwerdt and Wuppermann (2011).
- Using survey questions, we constructed teaching styles as
  - Growth mind set
  - Extrinsic Motivator
  - Constructive Teaching - Traditional Teaching
  - Warmth

- Voluntary teaching improvement effort
  - Seminars, certificate programs (Best practices in teaching)
- Voluntary effort for student enrichment
  - outings for science and art
  - involving scientific extra-curricular projects

# Summary Statistics: Students

Variable	Student				
	Boys	Girls	tstat	min	max
Maths Score	0.01(1.01)	-0.01(0.99)	0.72	-1.56	2.17
Turkish Verbal Score	-0.09(1.01)	0.09(0.98)	6.36	-2.20	1.67
Grade	3.44(0.51)	3.46(0.51)	1.09	3	4
Age (in months)	109.80(8.12)	109.33(7.71)	2.16	66	183
Raven Score	-0.06(1.03)	0.06(0.96)	4.30	-2.85	2.60
<b>School Performance</b>					
Turkish	4.05(1.13)	4.03(0.97)	7.81	1	5
Maths	3.98(1.23)	4.30(1.17)	1.50	1	5
Behavioral	4.30(0.91)	4.58(0.72)	11.31	1	5
<b>Behavior and Attitudes</b>					
Gender S-typing Score	0.15(0.99)	-0.15(0.98)	11.06	-2.47	2.09
Academic Self-Confidence	2.51(0.54)	2.46(0.54)	2.65	1	3
Growth Mindset	0.00(1.03)	-0.00(0.96)	0.12	-3.30	2.12
High Occupational Aspiration	0.71	0.85		0	1
Risky Behavior	0.05(1.00)	-0.05(1.00)	3.35	-1.65	1.70
Impatience	0.03(1.02)	-0.03(0.97)	1.80	-1.34	1.66
<b>Family</b>					
Family Gender Styting	2.33(1.14)	2.28(1.11)	1.58	1	4
SES	1.85(0.74)	1.86(0.75)	0.44	1	3
Low income (Column %)	36.0	36.3			
middle income (Column %)	43.3	41.8			
High income (Column %)	20.7	21.9			
Working Mother	0.29(0.46)	0.27(0.44)	2.04	0	1
Computer	0.76(0.43)	0.74(0.44)	1.67	0	1
Parents are reading to the child	0.29(0.45)	0.28(0.45)	0.95	0	1

Standard errors in parentheses





# Summary Statistics: Teachers

Variable	Teacher		Tstat	Min	Max
	Male Teacher	Female Teacher			
Gender (%)	23.6	76.4			
Age	41.82(11.79)	38.82(9.09)	1.67	23	63
Years of Teaching	18.05(9.83)	14.48(8.25)	2.52	1	44
# of terms as the class teacher	5.15(2.21)	5.24(2.21)	0.21	1	8
Tenure	1.00	0.89	2.20	0	1
Degree (column %)					
2-year Community College	15.4	4.8			
University	76.9	88.1			
Graduate school	7.7	7.1			
Major (column %)					
Classroom Teacher	84.6	65.6			
Linguistics	0	7.2			
Science & Engineering	7.7	11.2			
Social Sciences	2.6	5.6			
Other	5.1	10.4			
Teacher Effort					
Number of Volunteer Activities	12.69(9.09)	9.93(8.01)	1.82	0	30
Number of Extra Curricular Programs	3.76(5.04)	3.83(4.86)	0.08	0	40
Teaching Styles					
Growth Mindset	14.18(2.77)	14.64(2.29)	1.02	7	20
Extrinsic Motivator	10.37(1.95)	10.64(1.48)	0.92	5	16

$$y_{ikc} = cons + \alpha_1 Exp + \alpha_3 GRB_{kc} + \alpha_4 Exp * GRB_{kc} + \mathbf{X}_{ikc}\beta + \delta_c + \varepsilon_{ikc}$$

$Exp_{ikc}$  : Number of years student  $i$  has been taught by teacher  $k$ .  
(Short-term, Medium-term and Long-term)

$GRB_{kc}$ : Gender role beliefs of teacher  $k$

$X$ : Student, family and teacher characteristics

$\delta$  :Catchment area fixed effects

# Teacher's beliefs and Math Scores

Teacher G-Styping	-0.012 (0.05)	0.020 (0.04)	0.039 (0.04)	0.035 (0.05)	-0.022 (0.05)	-0.021 (0.05)
Medium Term	0.121* (0.07)	0.087 (0.05)		0.098* (0.05)	0.093* (0.05)	0.080 (0.05)
Long-Term	0.268*** (0.08)	0.236*** (0.06)		0.214*** (0.06)	0.194*** (0.06)	0.182*** (0.06)
Medium Term*Teacher G-Styping	-0.066 (0.06)	-0.082 (0.05)		-0.109** (0.05)	-0.101* (0.05)	-0.096* (0.06)
Long Term*Teacher G-Styping	-0.109 (0.07)	-0.138** (0.06)		-0.133** (0.07)	-0.157** (0.07)	-0.138** (0.07)
Catchment Fixed Effect	✓	✓	✓	✓	✓	✓
Student Characteristics		✓	✓	✓	✓	✓
Family Characteristics			✓	✓	✓	✓
Teacher Characteristics				✓	✓	✓
Teaching Styles					✓	✓
Teacher Effort						✓
N	3813	3813	3813	3813	3813	3813

# Teacher's Beliefs and Verbal Scores

Teacher G-Styping	-0.021 (0.05)	0.006 (0.04)	0.023 (0.04)	-0.004 (0.04)	-0.014 (0.04)	-0.018 (0.04)
Medium Term	0.082 (0.06)	0.060 (0.05)		0.041 (0.05)	0.032 (0.05)	0.019 (0.05)
Long-Term	0.122* (0.07)	0.084 (0.06)		0.039 (0.06)	0.023 (0.05)	0.015 (0.05)
Medium Term*Teacher G-Styping	-0.055 (0.06)	-0.063 (0.05)		-0.068 (0.05)	-0.067 (0.05)	-0.054 (0.05)
Long Term*Teacher G-Styping	-0.083 (0.07)	-0.098 (0.06)		-0.106* (0.06)	-0.106* (0.06)	-0.087 (0.06)
Catchment Fixed Effect	✓	✓	✓	✓	✓	✓
Student Characteristics		✓	✓	✓	✓	✓
Family Characteristics			✓	✓	✓	✓
Teacher Characteristics				✓	✓	✓
Teaching Styles					✓	✓
Teacher Effort						✓
N	3819	3819	3819	3819	3819	3819

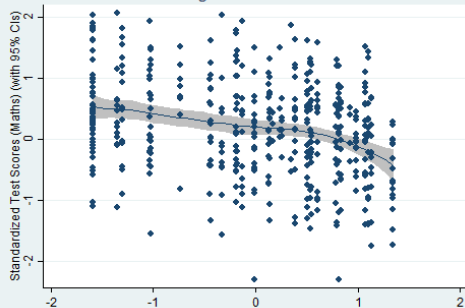
# Teacher's Beliefs and Test Scores - Subsample

	Math Score		Verbal Score	
	Girls	Boys	Girls	Boys
Teacher G-Styping	0.007 (0.07)	-0.038 (0.06)	0.049 (0.04)	-0.083* (0.05)
Medium Term	0.034 (0.07)	0.118* (0.06)	0.006 (0.06)	0.029 (0.07)
Long-Term	0.129 (0.08)	0.224*** (0.07)	0.002 (0.07)	0.024 (0.07)
Medium Term*Teacher G-Styping	-0.111* (0.07)	-0.089 (0.07)	-0.108** (0.05)	-0.000 (0.07)
Long Term*Teacher G-Styping	-0.229** (0.09)	-0.064 (0.08)	-0.150** (0.08)	-0.026 (0.07)
Catchment Fixed Effect	✓	✓	✓	✓
Student Characteristics	✓	✓	✓	✓
Family Characteristics	✓	✓	✓	✓
Teacher Characteristics	✓	✓	✓	✓
Teaching Styles	✓	✓	✓	✓
Teacher Effort	✓	✓	✓	✓
N	1870	1943	1873	1946

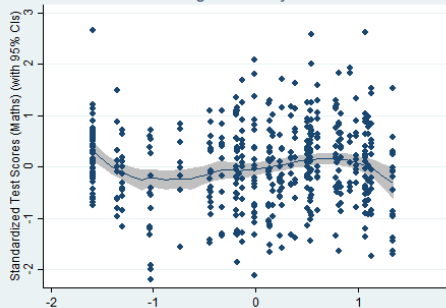
# Teacher's Beliefs and Math Test Score: Long-Term

$$y_{ikc} = X\beta + \delta_c + f(\text{GRB}_{kc}) + \varepsilon_{ikc}$$

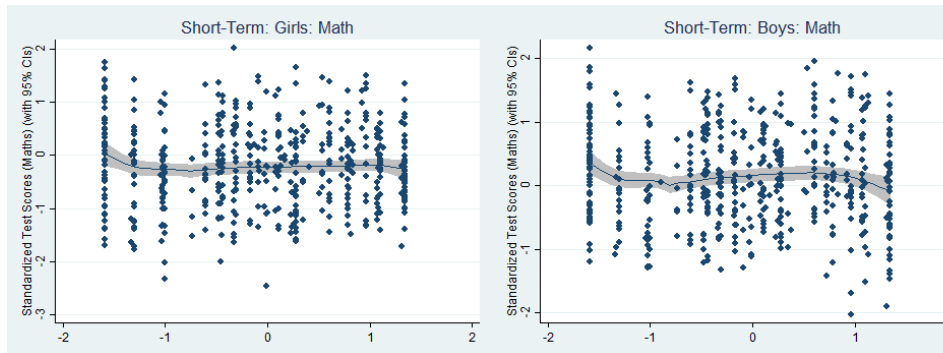
Long-Term: Girls: Math



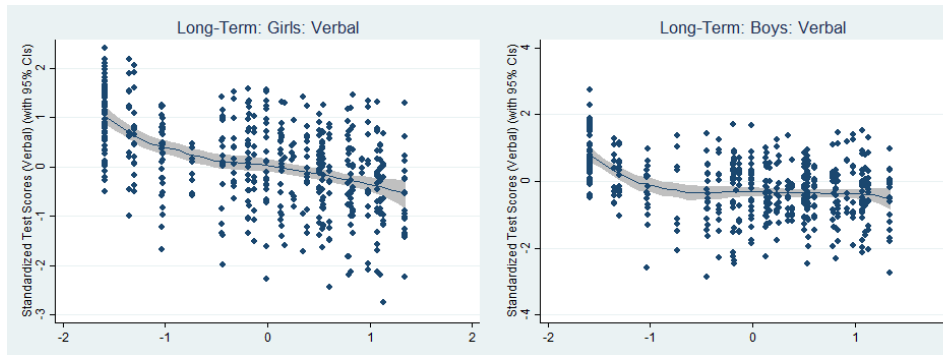
Long-Term: Boys: Math



# Teacher's Beliefs and Math Test Score: Short-Term

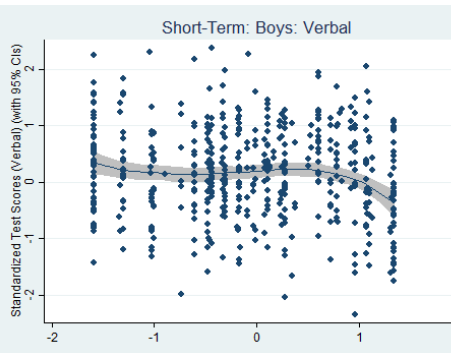
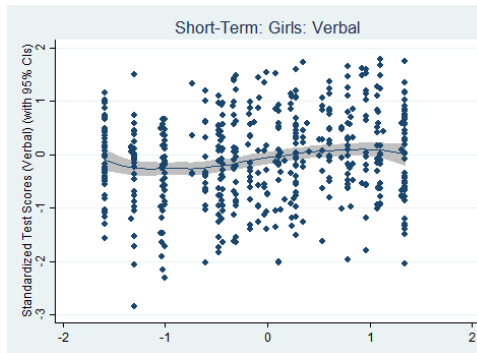


# Teacher's Beliefs and Verbal Test Score: Long-Term

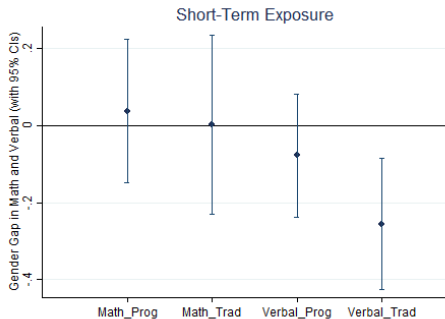
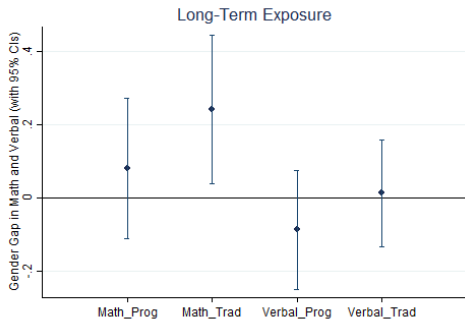




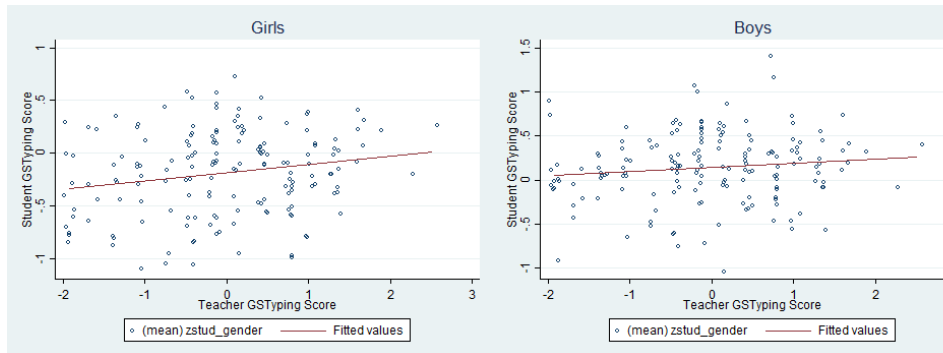
# Teacher's Beliefs and Verbal Test Score: Short-Term



# Effect on Gender Gap in Math and Verbal



# Teacher's Beliefs and Student's Beliefs



# Teacher's Beliefs and Student's Beliefs

	Girls		Boys	
Teacher G-Styping	0.083** (0.04)	0.148** (0.07)	0.056* (0.03)	0.089 (0.06)
Medium Term		-0.025 (0.06)		-0.003 (0.06)
Long-Term		-0.086 (0.08)		0.005 (0.08)
Medium Term*Teacher G-Styping		-0.074 (0.08)		-0.067 (0.08)
Long Term*Teacher G-Styping		-0.028 (0.08)		-0.121 (0.08)
Catchment Fixed Effect	✓	✓	✓	✓
Student Characteristics		✓		✓
Family Characteristics		✓		✓
Teacher Characteristics		✓		✓
Teaching Styles		✓		✓
Teacher Effort		✓		✓
N	1913	1913	1995	1995

- Teachers are important adults in children's lives.
- Their beliefs and attitudes influence children, positively as well as negatively.
- Their beliefs regarding gender roles affect achievement outcomes of girls.
  - Longer the time spent with the same teacher larger the effect on girls' math and verbal test scores
  - A long-term exposure to a very progressive teacher mitigates gender achievement gaps

# Determinants of Teacher's Beliefs

Male	0.184 (0.18)	0.214 (0.18)	0.046 (0.17)	0.060 (0.17)
University Degree	-0.135 (0.30)	-0.236 (0.29)	-0.240 (0.29)	-0.239 (0.28)
Graduate Degree	-0.521 (0.41)	-0.635 (0.40)	-0.582 (0.38)	-0.576 (0.37)
Years of Experience	-0.011 (0.01)	-0.015* (0.01)	-0.001 (0.01)	-0.001 (0.01)
Tenured	0.671** (0.32)	1.032*** (0.39)	0.785*** (0.30)	0.724** (0.30)
Number of Terms in the School	-0.002 (0.04)	-0.008 (0.04)	-0.003 (0.03)	0.012 (0.03)
Education Degree		0.591** (0.24)	0.608*** (0.22)	0.714*** (0.22)
Linguistics		-0.138 (0.38)	-0.221 (0.36)	-0.192 (0.36)
Natural Sciences		0.674** (0.34)	0.433** (0.20)	0.464** (0.22)
Social Sciences		0.195 (0.34)	0.023 (0.27)	0.030 (0.27)
Growth Mindset			-0.154*** (0.03)	-0.151*** (0.03)
Extrinsic Motivator			0.074* (0.04)	0.058 (0.04)
Constructive Teaching			-0.038 (0.03)	-0.027 (0.03)
Warm Approach			-0.082*** (0.03)	-0.080*** (0.03)
Number of Extra_C Programs				0.002 (0.01)
Number of Volunteer Activities				-0.028** (0.01)
Constant	-0.317 (0.38)	-0.543 (0.43)	2.684*** (0.89)	2.636*** (0.89)
N	145	145	145	145