Ticket to the Ark: does School Impact Student's Resilience?

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What is a resilience

- Hart and Gagnon (2014) “Resilience is overcoming adversity, whilst also potentially tinkering with, or even dramatically transforming, (aspects of) that adversity”.
- PISA: Resilient students come from disadvantaged backgrounds yet exhibit high levels of school success. (OECD, 2011).
- Ungar and coauthors spread the term meaning on person’s social context also. Naming this phenomenon Ecological definition of resilience (Ungar 2011).

Factors of resilience

- Individual: autonomy, self-efficacy (Polk 1997; Jacelon 1997; Werner & Smith 1982; Masten et al, 2008), social and communication skills (Luthar, Zilger, 1991; Werner & Smith 1982), cognitive abilities (Rutter 1987; Write, Masten 1997; Brooks 1994), grit (Zimmerman, Schunk, 1989). Personal methods aimed at acquiring knowledge and skill (Zimmerman, Martinez-Pons, 1988; Zimmerman, 2003), problem-solving skills (Masten,2008).
- School: governance, policy, senior leadership, ethos and attitude; Teachers: skills, training, roles and responsibilities; Family and Community: careers, services, local authority (Hart, Green, 2014)
- Student's relationship to school, achievement expectations, academic motivation (Anderson-Butcher, Amorose, Iachini, & Ball, 2012).

Resilience in TIMSS

Student factors	School factors
Educational aspirations	Teachers' beliefs that students can do well in mathematics
Value of mathematics	Emphasis on academic success
Experiences with bullying	Safety and discipline
	Percentage of economically disadvantaged students
	Effects of shortages in educational resources on instruction

Erberber E. et al. Socioeconomically disadvantaged students who are academically successful: Examining academic resilience cross nationally. IEA's Policy Brief Series. Amsterdam: , 2015.

Research goal

To identify the relationship between school and school-related individual characteristics and the possibility of students from SES-disadvantaged families to achieve high level of educational outcomes.

- Whether resilient schools could be identified as well as resilient students.
- How those school and school-related individual characteristics affect resilience and academic performance in general.
- Whether those characteristics affect PISA and TIMSS resilience in a different manner.

METHODOLOGY

Data

- Data of longitudinal panel survey “Trajectories in Education and Career” in Russia.
  - Wave 1. 8th grade. TIMSS 2011 (4893 students, 210 schools)
  - Wave 3. 9th grade. PISA 2012 (4399 students, 208 schools).
  - Data mainly from students’ questionnaire.
  - Only questions about achievement expectations from teachers’ and principals’ questionnaires.
  - Data were analyzed on individual (students) and institutional (schools) levels.

Variables definitions

- Resilient student (RS) – low SES student who falls in the top third of performance distribution.
- The same for resilient school. Data on class SES and achievement were aggregated from students responses.
- SES – aggregated measure based on mother's education, ESCS PISA index, number of books at home, articles at home. Student were divided into three groups: low, middle and high SES.
- Student attitudes towards mathematics. TIMSS student questionnaire indices:
  - Students Like Learning Mathematics; Students Value Mathematics; Students Confident in Mathematics; Students Engaged in Mathematics Lessons; Students Opinion of Teachers Expectations.

Regression models

Two series of SEM models

1. Resilient vs non-resilient students (logit)
   - Resilience in PISA, TIMSS and PISA-TIMSS
   - Low SES students only
2. Math scores
   - PISA or TIMSS scores
   - Two subsamples: low SES students and medium to high SES students (gives an opportunity to compare the model for RS vs non-RS. And allows comparison of the effect for different SES groups)

RESULTS

Resilient students

- TIMSS-resilient 362 (7,4%).
- PISA-resilient 314 (7,1%).
- TIMSS-PISA-resilient 185 (4,2%).

- *Percentages are from the whole sample*

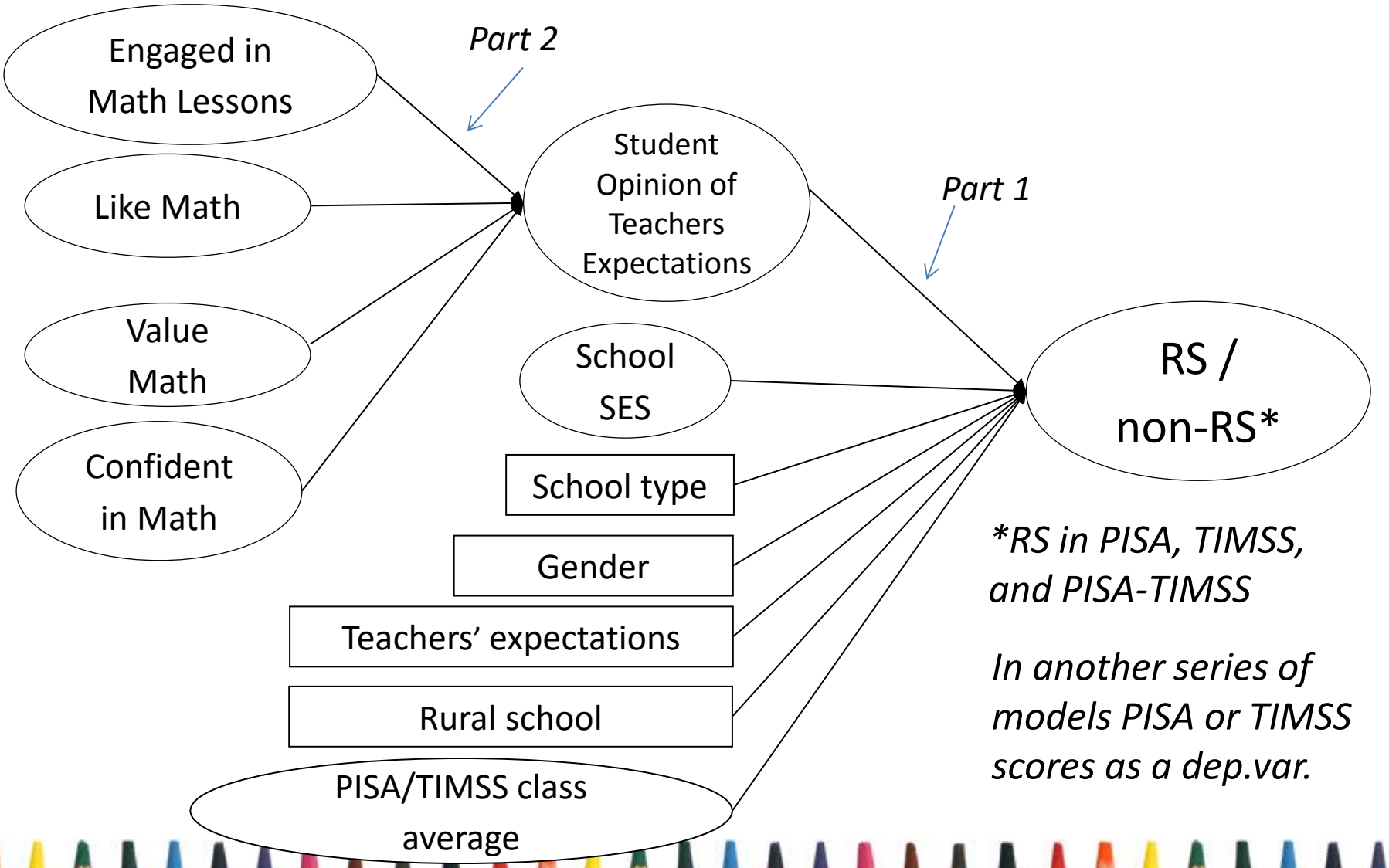
Resilient students

	N	TIMSS score	PISA score	Elite schools	High SES schools
		TIMSS-resilience (8 grade)			
Resilient students	362	625		**24%**	**34%**
Non-resilient students with low SES	1133	491		8%	10%
		PISA-resilience (9 grade)			
Resilient students	314		573	**21%**	**33%**
Non-resilient students with low SES	1028		436	9%	10%
		TIMSS-PISA-resilience (8 и 9 grade)			
Resilient students	185	631	585	**34%**	**45%**
Low SES	1495	522	465	12%	16%
Middle SES	2034	543	493		
High SES	1360	555	505		

Resilient schools and schools-”nests of resilience”

	Resilient schools		Schools-”nests”	
	PISA	**TIMSS**	**PISA**	**TIMSS**
Number of schools	7	15	23	25
Average amount of RS at school	42% (12 - 83%)	37% (8 - 75%)	30%	34%
Elite school			5 (22%)	7 (28%)
Share of RS attending resilient (“nest”) schools from the whole number of RS	10%	21%	34%	39%

SEM model



**RS in PISA, TIMSS, and PISA-TIMSS*

In another series of models PISA or TIMSS scores as a dep.var.

Regressions. Resilient/non-resilient student

Significant factors (all positive)	Factors significant in some models	Non-significant factors
Student Opinion of Teachers Expectations	High school SES (in TIMSS/PISA. Increase the odds of being RS)	Rural school
All attitudes towards mathematics	Low school SES (in TIMSS. Decrease the odds of being RS)	Teachers' expectations
PISA/TIMSS scores class average (small coefficient)	Elite school (in TIMSS in the models without TIMSS class average)	
	Gender (in PISA)	

Regressions.
TIMSS or PISA scores

Significant factors (all positive)	Non-significant factors
Student Opinion of Teachers Expectations	Rural school
All attitudes towards mathematics	Gender
Elite school	
High school SES (coefficients are higher for low SES students)	

Conclusions. Institutional level

There are schools that can provide high academic achievement in SES disadvantaged environment.

Resilient schools

- 7 schools in PISA, 15 schools in TIMSS.
- They accumulated 10% and 21% resilient students, respectively.
- Average amount of RS in the class is 40%.

«Schools – nests of resilience»

- 23 schools in PISA, 25 schools in TIMSS.
- They accumulated 34% and 39% resilient students, respectively.
- 5 schools in PISA and 11 in TIMSS are the same as resilient schools.

Conclusions. Individual level

Resilience persistently related to:

- Student Opinion of Teachers Expectations
- All attitudes toward math
- PISA or TIMSS score class average
- High school SES

Student Opinion of Teachers Expectations is a **mediator** between resilience or high achievements and attitudes toward math. Student has to know that the teacher believe in her or him.

Conclusions. Theory

- Factors of resilience and of higher academic achievements are similar. However for students from SES disadvantaged families they could be more important as they do not have much family support.
- Factors of resilience work in the same manner for TIMSS and PISA.
- Limitation: we are not able to claim causality.

Discussion. Whether there is something from school here?

	Like Learning Math	Value Math	Confident in Math	Engaged in Math Lessons	Student Opinion of Teachers Expectations	N
TIMSS-resilient schools	10.6	10.3	10.2	10.6	5.7	15
Non-resilient schools in TIMSS	10.2	9.9	9.7	10.1	5.3	52
High SES schools	10.5	9.8^{T}	10.2	10.1	5.5	67
PISA-resilient schools	10.5	10.2	10.0	11.0	5.5	7
Non-resilient schools in PISA	10.2	10.0	9.8	10.1	5.4	60

Discussion. Further research

Case studies in some resilient schools or “schools-nests of resilience”. School-climate and teaching practices.

Thank you!

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Resilient vs non-resilient students

		TIMSS		PISA	
		Resilient	**Non-resil.**	**Resilient**	**Non-resil.**
School	Teachers' expectations	3.2*	3.1*	3.3*	3.1*
	Teachers' expectations (principal)	3.3*	3.2*	3.3*	3.2*
Mathematics	Students Like Learning Math	10.8*	9.9*	10.5*	10.04*
	Students Value Math	10.1*	9.7*	9.9*	9.8*
	Students Confident in Math	10.8*	9.2*	10.4*	9.4*
	Students Engaged in Math Lessons	10.5*	9.8*	10.1*	9.9*
	Student Opinion of Teachers Expectations	6.0*	5.0*	5.7*	5.1*
	N	362	1133	314	1028