The Effect of Teachers' (De)Motivating Teaching Style on Engagement and Achievement in Mathematics: Lithuanian case

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Introduction

- Active engagement in math classes is a key contributing factor to adolescents' academic success and selection of future careers in STEM (Maltese & Tai, 2010; Wang & Degol, 2014)

- Math engagement declines during the school years (Martin, Way, Bobis, & Anderson, 2015; Sherrer, Preckel, 2019)

- Students' mathematics performance

    - a big issue in Lithuania
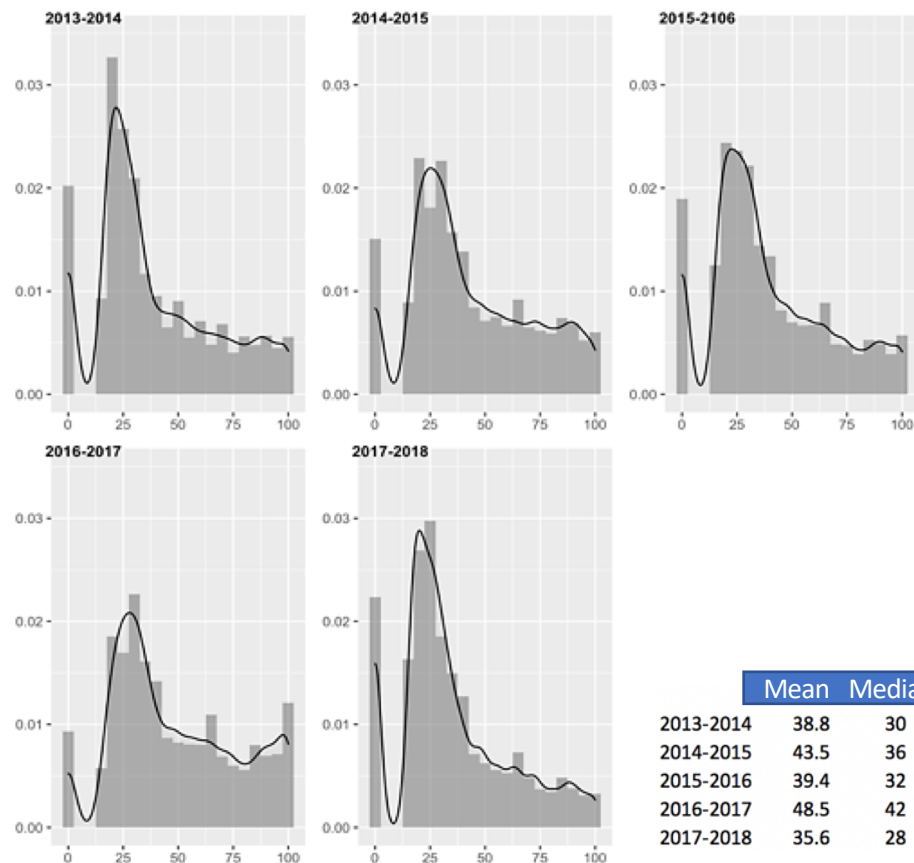
From PISA study (OECD, PISA 2018)
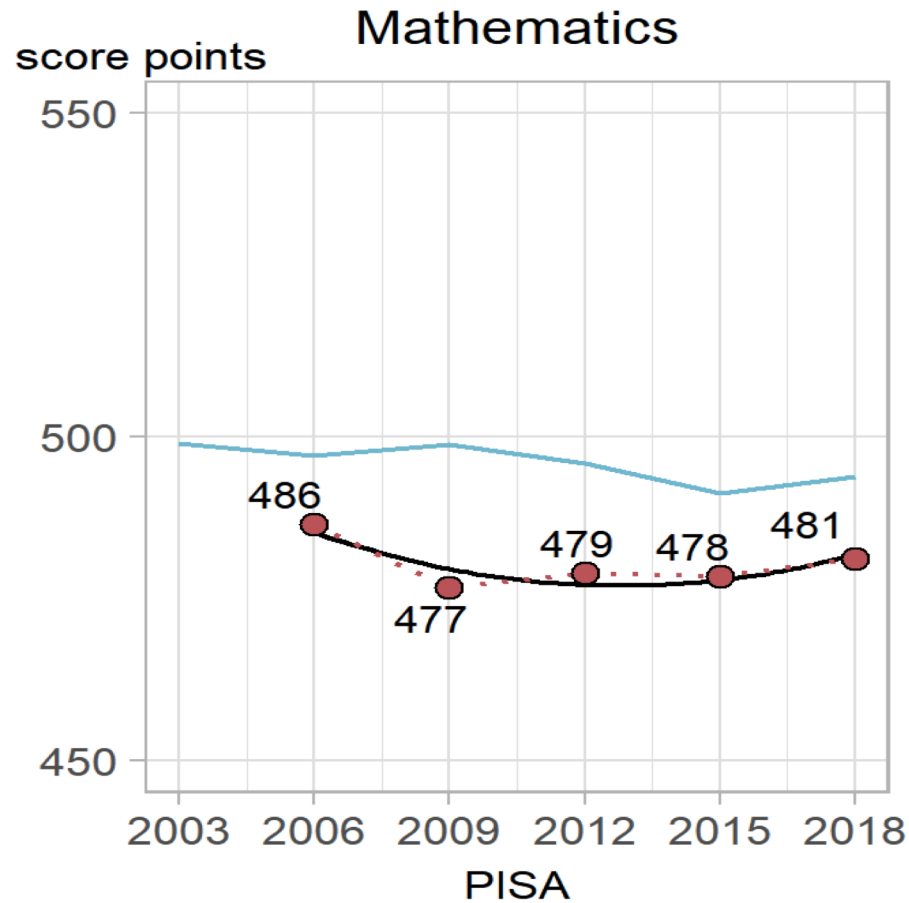
From 5-year Lithuanian national exams data
(Jakaitiene et al., 2021)

10th grade examination

	Mean	Median
2011-2012	6	6
2012-2013	5.1	5
2013-2014	5.9	6
2014-2015	5.6	5
2015-2016	5.8	6

Matura examination

	Mean	Median
2013-2014	38.8	30
2014-2015	43.5	36
2015-2016	39.4	32
2016-2017	48.5	42
2017-2018	35.6	28
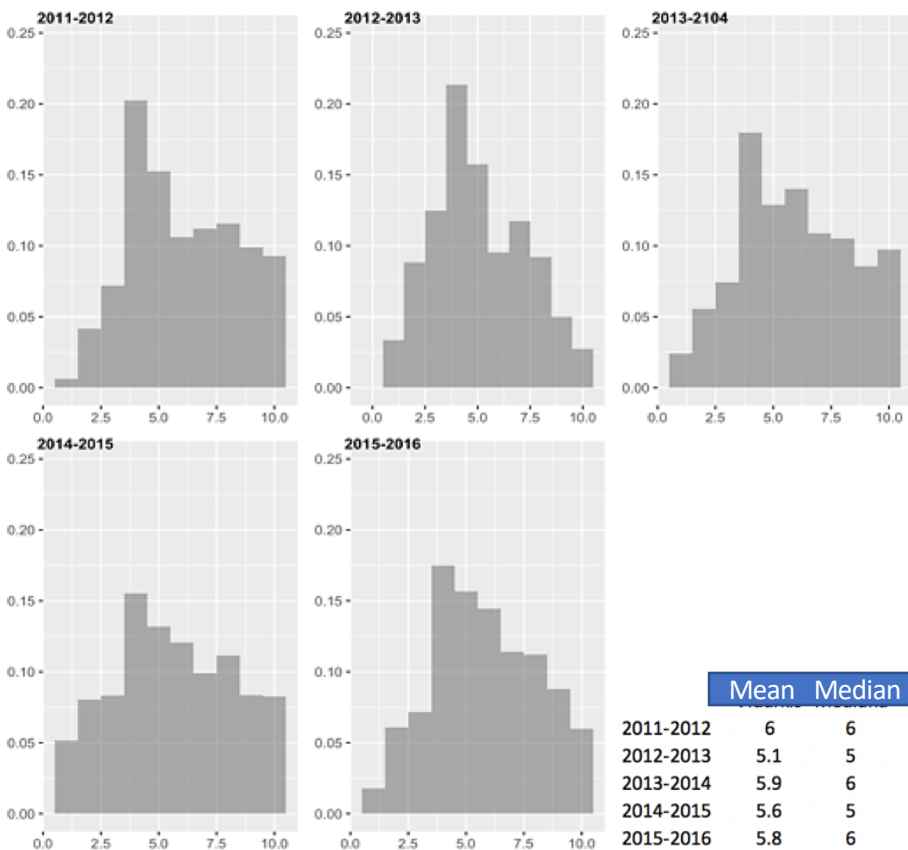
Theoretical background

- Self-determination theory (Ryan, Deci, 2000; 2017)
- Teachers foster students' engagement when manage to support students' three basic psychological needs, while the thwarting of these needs result in students disengagement (Vansteenkiste, Ryan, 2013)
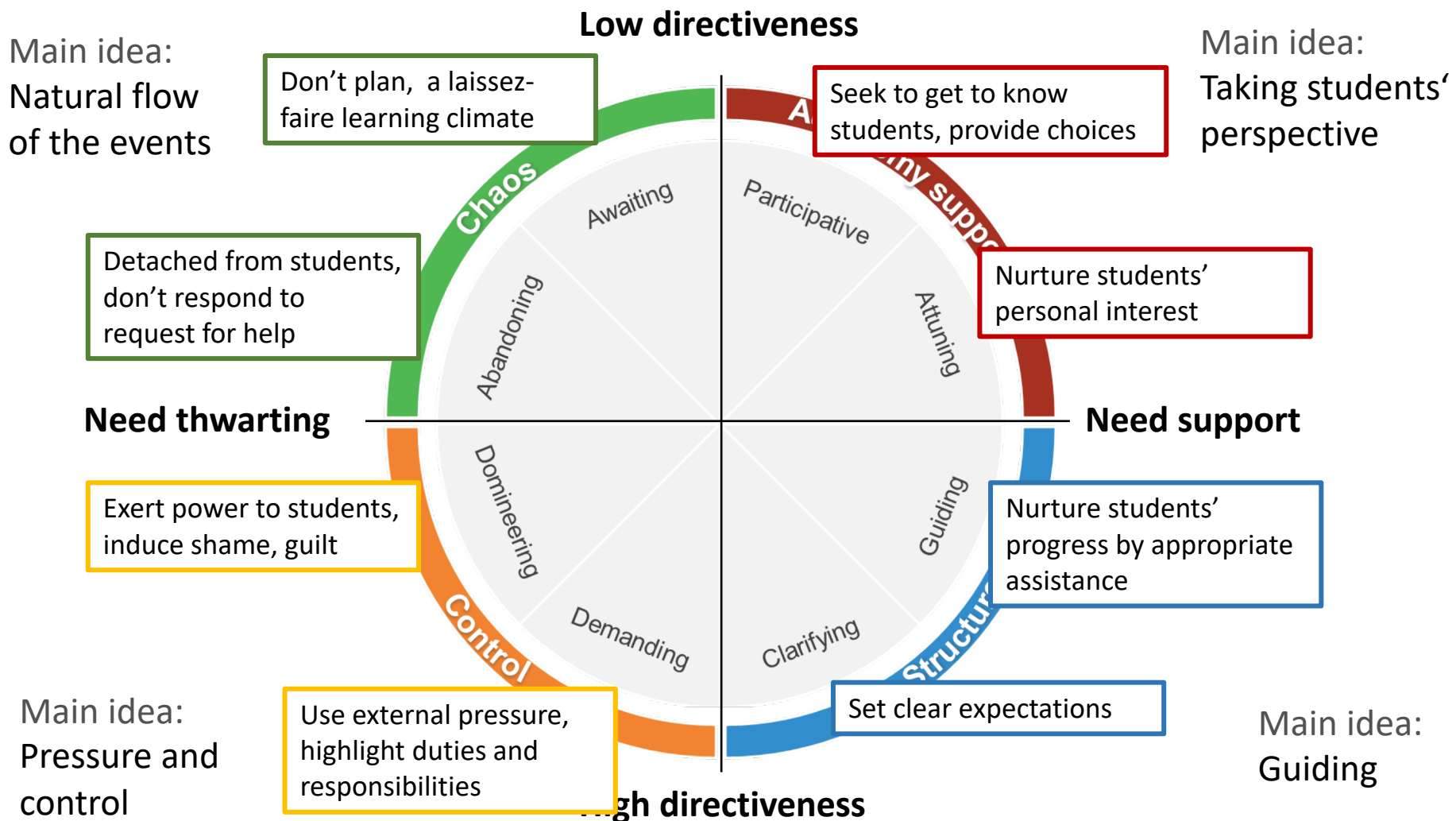
Autonomy

Competence

Relatedness
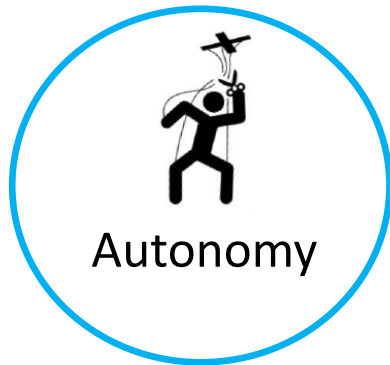
Freedom to be yourself

Effectiveness

Connection, warmth with other

Circumplex model

Low directiveness

High directiveness

Need thwarting

Need support

Main idea:
Natural flow of the events

Main idea:
Taking students' perspective

Main idea:
Pressure and control

Main idea:
Guiding

Don't plan, a laissez-faire learning climate

Seek to get to know students, provide choices

Detached from students, don't respond to request for help

Nurture students' personal interest

Exert power to students, induce shame, guilt

Nurture students' progress by appropriate assistance

Use external pressure, highlight duties and responsibilities

Set clear expectations

Chaos · Awaiting · Participative · Autonomy support · Attuning · Abandoning · Domineering · Guiding · Demanding · Clarifying · Control · Structure

Aelterman et al., 2019

Problem

- Two studies (Aelterman et al., 2019; Delrue et al., 2019) investigated the relations between the eight teaching approaches and students' motivational (i.e., need fulfillment and frustration, motivation) and learning outcomes (i.e., rated teacher quality, self-regulated learning, oppositional defiance).
- There is a need to identify the unique correlates of specific teaching approaches that contribute to students' engagement.

Current study

- **Goal:** examine how the eight teaching approaches defined by circumplex model predict students' engagement and achievement in math.

Participants

715 Lithuanian students from 7 and 8 grades

Gender 364 (50.9%)   287 (40.1%)

Schools 10 (16-131 students per school)

Classes 48 (6-26 students per class)

Math performance M= 6.73, SD=1.98
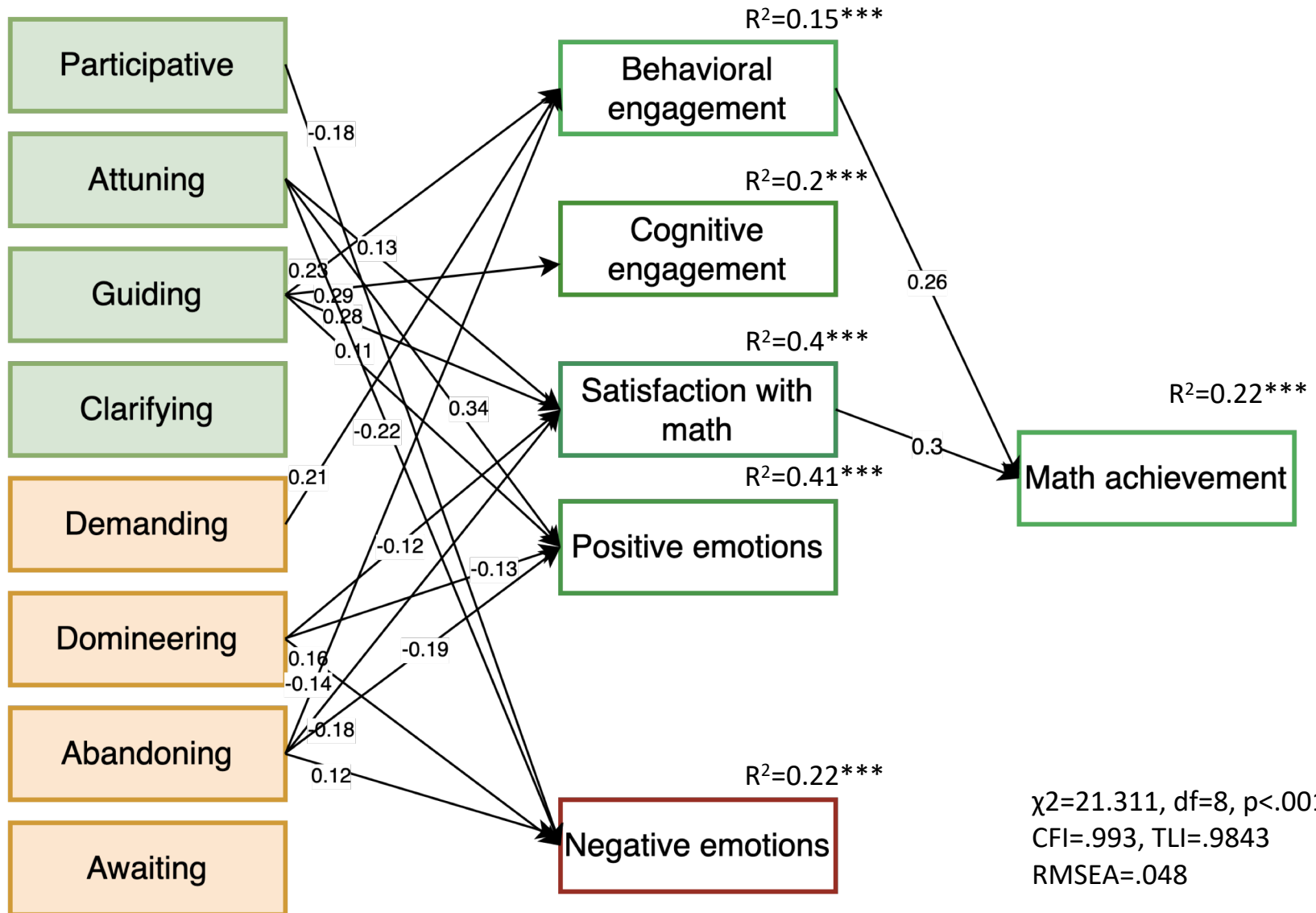
Methods: (De)Motivating teaching styles

- **Situations in School Questionnaire - Education**, student version (SISQ, Aelterman et al., 2018)
- Lithuanian version adapted to math context
- 15 situational vignettes with 4 different teacher's behavioral responses
- a response scale from 1 (*does not describe my teacher*) to 7 (*describe my teacher extremely well*)

Scale	Subscale	Items	Example	Reliability
Autonomy support	Participative	5	*Asks you which types of practice problems you may want to work on the most*	0.76
	Attuning	10	*Tries to find ways to make the lesson more interesting and enjoyable for you.*	0.88
Structure	Guiding	8	*Clarifies and reframes the question so that you can answer it.*	0.87
	Clarifying	7	*Provides a clear, step-by-step schedule and overview for the class period.*	0.80
Control	Demanding	8	*Insist that you have to finish all your required work- no exceptions, no excuses.*	0.61
	Domineering	7	*Pound the desk and say loudly: "Now it is time to pay attention!"*	0.63
Chaos	Abandoning	10	*Sighs. Just gives the answer him-/herself and moves on.*	0.81
	Awaiting	5	*Not plan or organize too much. The lesson will unfold itself.*	0.70

Methods: Engagement and Achievement

Indicator	Items	Example	Response options	Reliabi-lity
ENGAGEMENT				
Stem: How much do you agree with the following statements about you. Think about learning math.				
Behavioral engagement	3	*I pay attention during math class*	1 *(completely untrue)* – 5 *(completely true)*	0.75
Cognitive engagement	3	*I remind myself not to make the same mistakes I made before*		0.72
Satisfaction with math classes	3	*I look forward to math lessons*		0.85
Stem: Evaluate how you have been feeling during math lessons lately. Indicate how often you feel this way.				
Positive emotions	3	*Inspired, Interested, Cosy*	1 *(never)* – 5 *(always)*	0.79
Negative emotions	3	*Upset, Irritable, Tense*		0.70
ACHIEVEMENT				
Math	1	*What grades do you usually get during math lessons?*	1-3, 4,5,6,7,8,9,10	

Results: Path analysis

Participative

Attuning

Guiding

Clarifying

Demanding

Domineering

Abandoning

Awaiting

-0.18

0.13

0.23
0.29
0.28
0.11

-0.22

0.34

0.21

-0.12

-0.13

0.16
-0.14

-0.19

-0.18

0.12

Behavioral engagement
$R^2=0.15$***

Cognitive engagement
$R^2=0.2$***

Satisfaction with math
$R^2=0.4$***

Positive emotions
$R^2=0.41$***

Negative emotions
$R^2=0.22$***

Math achievement
$R^2=0.22$***

0.26

0.3

$\chi2=21.311$, df=8, p<.001
CFI=.993, TLI=.9843
RMSEA=.048

Conclusions

1. (De)motivating teaching is related to students' math achievement indirectly via students' behavioral engagement and satisfaction with math classes.
2. Of all the eight teaching approaches, attuning and guiding have the most significant positive impact on student engagement.
3. Contrary, domineering and abandoning approaches have the most significant negative impact on student engagement.

Practical implications

1. For students, it is beneficial when teachers nurture their personal interests and progress by trying to find ways to make learning math more interesting and enjoyable (attuning), and by providing appropriate help and assistance when needed (guiding).
2. Using power-assertive practices such as guilt induction or shaming that target students' personality (domineering) and being unresponsive to students' struggles and concerns (abandoning) are the most harmful to students' emotional engagement in math.
3. The circumplex model can help teachers reflect on how they lead students and get insights how to interact with students' in motivating and need-supportive way.

Thank you for your attention☺

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