

# Academic Optimism and Non-Cognitive Outcomes in Czech Lower Secondary Schools<sup>1</sup>

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**Academic Optimism and Non-Cognitive Outcomes in Czech Lower Secondary Schools.** Educational effectiveness research shows that teacher beliefs influence how teachers interact with students and thus affect not only the quality of their instruction but also students' learning outcomes. A teacher's interpersonal relationship styles, supportiveness, and mindset with regard to all students' abilities to succeed were found to be predictive not only of students' academic achievement, but also of non-cognitive outcomes such as engagement in school, learning motivation, or positive social development. The purpose of this paper is to explore the relationship between three non-cognitive outcomes of Czech lower secondary students in grade 9, perseverance, self-efficacy, and educational aspirations, and the attitudes of their teachers that are operationalized as academic optimism. The data set used for the analysis presented in this paper contained data from 4798 grade 9 students and 1469 teachers from 124 basic schools and 39 grammar schools that was collected in the Czech Longitudinal Study in Education in 2016. Two-level structural equation modelling is used to test the hypothesis that students' non-cognitive outcomes are related to the academic optimism of their teachers. Academic optimism was directly related to both students' self-efficacy and class composition according to socio-economic status. These are very important findings with respect to tracking practices in the Czech education system since they exhibit not only early tracking but also a strong differentiation within individual tracks according to socio-economic status.

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## Introduction

Educational effectiveness research shows that teacher beliefs influence how teachers interact with students and, thus, affect not only the quality of their instruction but also students' learning outcomes. A teacher's interpersonal relationship styles, supportiveness, and mindset with regard to all students' abilities to succeed were found to be predictive not only of students' academic achievement, but also of non-cognitive outcomes such as engagement in

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school, learning motivation, or positive social development (e.g. Reynolds et al. 2015).

Recently, there has been an intensive debate about the importance of students' non-cognitive characteristics and their role in predicting cognitive outcomes. Non-cognitive student characteristics, however, have proved to be not only significant predictors of academic achievement but also important outcomes of schooling as they predict later success in life (Duckworth – Gross 2014).

The purpose of this paper is to explore the relationship between the non-cognitive outcomes of Czech lower secondary students in grade 9 and the attitudes of their teachers.

### **The importance of studying the attitudes of Czech teachers and their relation to student outcomes**

In recent decades, Czech public compulsory education has been facing increasing differentiation. Educated and motivated parents tend to choose compulsory schools for their children more and more carefully. The proportion of parents that choose a school for their children instead of sending them automatically to a nearby school almost doubled between 2009 and 2014 (from 33 to 63%) (Straková – Simonová 2015). Some parents choose private schools, which have recently been increasing their offer in reaction to parental demand. While private primary schools are still attended by a very small proportion of students (2%), their number increased by 25% in the 2016/2017 school year (from 157 to 195) and many new ones are in the process of preparation.

Parents who want to secure quality education for their children also seek special education opportunities in the public school system, which offers schools and classes for talented children, bilingual schools and classes, and schools with extended curricula in selected subjects (e.g. foreign languages). In some cases these special education opportunities include extra fees. There is no data available on these special options within the public system and on the proportions of children attending selective classrooms. By careful selection of the right educational pathway for their children parents try to secure an advantage in the competitive environment of higher education and later on also on the labour market (Kašparová – Klvaňová 2016). Not all parents, however, are prepared to guide their children carefully during the transition from lower secondary to higher secondary education. For those children, the attitudes and guidance of their teachers matter the most. As Bittnerová (2005) showed, the effort of teachers in a school with a high proportion of Roma students led to students having better subsequent educational careers. In the same ethnographic study, teachers played an important role in preparing for admission tests (Viktorová 2005).

Parental educational expectations are strongly related to parents' education and are mirrored in the school attended by the child (Kaščák – Betáková 2014, Hrubá 2017). The fact that motivated and educated parents select schools for their children and these children thus concentrate in some schools is mirrored in the differences between schools. Since 2006, the intraclass correlation in mathematics and reading achievement in the Programme for International Student Assessment (PISA) population (15-year-olds) has increased by about 10 percentage points in both mathematics (from 34.3 to 43.6%) and reading (from 34.1 to 43.1%). One of the biggest increments among OECD countries in student achievement associated with a unit increase in the PISA index of economic, social, and cultural status shows that in the Czech Republic, more than in other countries, schools are divided into those educating students with a favourable family background, who achieve good results, and those educating the rest of the students, with less favourable backgrounds and achievement (OECD 2016). Further strengthening of this trend may represent a serious problem not only for the Czech education system but also for Czech society. Further differentiation threatens social cohesion and encourages the emergence of social tensions. Schools used to be places where children from different social classes met and learnt to talk to each other and to discuss the topics their families have different opinions on, they learnt to get on and to respect each other. This cohesive function of school is weakened by differentiation (Green – Preston – Sabates 2003). It means that even though in schools for children from well-off families they can have better outcomes, they would not meet people from different backgrounds and they would not acquire the social skills needed for life in a heterogeneous society. The differentiation also threatens to worsen the education of the least educated part of society, which will lead not only to the wastage of human capital but also to increased social spending (e.g. Field – Kuczera – Pont 2007). It thus seems desirable to take measures that will seek to guarantee a standard quality of education in all public schools so that the choice of school would not be perceived as crucial and the differentiation would not be so pronounced.

The fundamental question is why parents choose schools so carefully, what they seek that is not guaranteed in regular public schools (or schools in the neighbourhood). The results of parental surveys show that they particularly look for a welcoming attitude towards parents and children and willingness and ability to accommodate children's special educational needs and disabilities (Straková – Simonová 2015). Czech schools do not offer this automatically. The emphasis in the Czech school system has always been on knowledge transfer; children have been required to accommodate themselves to the school and not vice versa. This is very probably one of the reasons why Czech schools have problems with educating students with special educational needs and

disabilities (the Czech Republic has traditionally been a country with a high proportion of SEN students educated outside mainstream education) (European Agency for Special Needs and Inclusive Education 2017) and also a reason for the high proportion of students with postponement of the commencement of school attendance (20.5% in the 2016/17 school year<sup>5</sup>). A similar problem is also faced by Slovakia. In their study on inclusive education, Kusá and Juščáková (2017) stated on the basis of a detailed description of teachers' attitudes that "schools and teachers are largely failing to cultivate inclusive attitudes and an inclusive class culture where no one is left behind."

Although, from the long-term perspective, the school system has been seen in public opinion polls as belonging among those public sector entities that are perceived as least problematic, in recent years there has been a slight increase in the level of dissatisfaction, even in the general adult population.<sup>6</sup> In 2017, the data showed a statistically significant decrease in the level of satisfaction with compulsory education and also a decreasing level of agreement with the statement that "in the Czech Republic, everybody can get education corresponding to his/her abilities".<sup>7</sup>

We argue that one of the important causes of the inability of schools to create a welcoming climate and to accommodate all families from the neighbourhood is the attitudes and beliefs of Czech teachers. Somewhat striking attitudes on the part of Czech teachers were confirmed by the Trends in International Mathematics and Science Study (TIMSS) in 2015, where, in international comparison, the Czech teachers expressed the relatively low expectations they had of children and also low levels of trust in parents and students. In the Teaching and Learning International Survey (TALIS) 2014, the Czech teachers expressed very low levels of self-efficacy in the area of student engagement: they did not believe that they can motivate students who show low interest in schoolwork or that they can help students to value learning or get students to believe that they can do well in schoolwork (OECD 2014). Recently, the Czech School Inspectorate analysis (CSI 2018) revealed that teachers would want the external factors (e.g. students' attitudes, better

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<sup>5</sup> Developmental Statistical Yearbook of Education 2016/2017: <http://www.msmt.cz/vzdelavani/skolstvi-v-cr/statistika-skolstvi/vyvojova-rocenka-skolstvi-2006-07-2016-17>

<sup>6</sup> At the beginning of 2017, among 29 areas of public life it scored in sixth place, behind services, culture, the environment, science and research, and public transport, just before human rights and healthcare. 20% of the respondents expressed dissatisfaction and 39% satisfaction. The areas scoring worst were corruption, criminality, immigration, the political situation, and the judiciary: ([https://cvvm.soc.cas.cz/media/com\\_form2content/documents/c2/a2166/f9/ps170301.pdf](https://cvvm.soc.cas.cz/media/com_form2content/documents/c2/a2166/f9/ps170301.pdf)). In the last three years, however, the proportion of those who are dissatisfied has increased from 12 to 20% ([https://cvvm.soc.cas.cz/media/com\\_form2content/documents/c2/a2151/f9/pd170127.pdf](https://cvvm.soc.cas.cz/media/com_form2content/documents/c2/a2151/f9/pd170127.pdf)) and the proportion of respondents that believed that we are experiencing a deterioration has increased ([https://cvvm.soc.cas.cz/media/com\\_form2content/documents/c2/a4271/f9/po170322.pdf](https://cvvm.soc.cas.cz/media/com_form2content/documents/c2/a4271/f9/po170322.pdf)).

<sup>7</sup> [https://cvvm.soc.cas.cz/media/com\\_form2content/documents/c2/a4433/f9/or171023.pdf](https://cvvm.soc.cas.cz/media/com_form2content/documents/c2/a4433/f9/or171023.pdf)

equipment, and more teaching hours) to change in order to improve teaching and learning and they do not think they can achieve improvements by their own efforts. We argue that these attitudes demonstrated in the surveys were not caused primarily by teacher self-reflection but mainly by the fact that they do not believe that engaging students belongs among their duties. We very often hear from Czech teachers that “the teacher cannot achieve anything when the family does not work properly”, which means that it is up to the family to motivate students to do their schoolwork and to form their educational aspirations and to help young students with their schoolwork. Studying teacher attitudes thus seems to be an important task because without changing these attitudes it would be very difficult to change the school climate and friendliness of Czech schools.

It is, however, also important to learn the extent to which the attitudes relate to student outcomes that are valued by Czech society and Czech teachers. It will be easier to argue that more attention should be devoted to teacher attitudes by teacher educators and education policy makers if we have evidence that they improve student outcomes.

### **Academic optimism and its relationship to learning outcomes**

Teacher attitudes have been conceptualized in many different ways. For our research, we have chosen the concept of academic optimism, which seems to be a promising concept in explaining teachers' beliefs towards their students. Academic optimism has been shown to be a latent construct that refers to three closely related concepts that have reciprocal relations with each other: the academic emphasis of the school, teachers' collective efficacy, and the collective trust of the teaching staff in students and parents. Academic emphasis refers to a school's drive for academic excellence. The teachers' collective efficacy represents collective judgments about the capability of the school as a whole to teach even the most difficult students. The collective trust of the teaching staff in students and parents is the belief that parents and students will cooperate in the process of education (Boonen et al. 2014; Hoy et al. 2006). All three components are interdependent and reinforce each other; e.g. when teachers trust parents, the staff can insist on higher academic standards without fear of being undermined; high academic standards reinforce collective trust; collective efficacy has a positive influence on achievement and academic emphasis, and such academic emphasis reinforces the development of collective efficacy.

Academic optimism has been proven to serve as a predictor of student achievement regardless of school composition, not only in the United States but also in several European and Asian countries (e.g. Boonen et al. 2014; Chang 2011). This could be used as an argument that a programme or intervention to

improve one of the elements of academic optimism must be supportive of the other two elements, e.g. strategies for strengthening academic emphasis, such as more competitive grading or higher standards, could undermine trust among teachers, students, and parents, and thus cannot be successful in the long run. It shows that not only academic emphasis but also mutual trust and teacher self-perception are crucial for effective teaching and learning.

In 2016, Straková et al. (2018) studied the concept of academic optimism in Czech schools using the operationalization of Fahy et al. (2010). They found a significant effect on students' achievement in mathematics, even after controlling for the socio-economic composition of the class and for prior achievement.

The finding that teacher academic optimism is related to a cognitive outcome is an important one. It may be interpreted in such a way that if we improve teacher attitudes then, irrespective of the composition of the student body and prior achievement, we have a chance to improve educational outcomes. This may be a good reason to pay more attention to teacher attitudes during the selection of future teachers and their education.

Cognitive outcomes, however, are not the only outcomes that matter. Non-cognitive outcomes have been emphasized as being as important as, or even more important than, cognitive outcomes. The econometricists Heckman et al. (2006) showed that non-cognitive skills explain important attributes such as schooling decisions, employment, wages, and participation in illegal activities. They declared that the improvement of non-cognitive skills specifically (and not IQ) may explain the effectiveness of early childhood programmes. Their findings were elaborated by many other researchers who found important associations between non-cognitive skills and various outcomes even though the mechanisms of influence still remained unclear for many of them (e.g. Reynolds et al. 2010; Zhou 2017).

From the many potentially strong predictors that may explain the variation in non-cognitive outcomes, we chose three that we already have in our data – perseverance, self-efficacy, and educational aspirations. The choice of self-efficacy and educational aspirations was driven by Bandura's (1999) social cognitive theory. This theory was further elaborated in social cognitive career theory by Lent, Brown, and Hackett (1994). According to this theory, personality traits and the contextual environmental characteristics influence self-efficacy and outcome expectations. The final educational aspirations are formed by interests, a person's psychological characteristics, and their socio-economic background. Even though we can find many studies which explore the relationships between educational aspirations, self-efficacy, and educational outcomes, not so many of them looked at teachers' attitudes. Therefore our goal was to explore their relationships with teachers' academic optimism.

Recently, grit, defined as “perseverance and passion for long-term goals” (Duckworth et al. 2007, p. 1087) has gained growing attention. The authors of the concept argue that grit, which is not correlated with IQ, may matter more than cognitive abilities to success in life. The approach taken by Duckworth and her colleagues inspired many other scientists to explore the role of grit more thoroughly. Suzuki et al. (2015) found that grit was a strong predictor for work performance in Japan – grittier individuals were more likely to engage with their work. Datu et al. (2016), however, revealed cross-cultural differences in grit, and they called the hierarchical structure of the construct into question and found out that the perseverance dimension of grit is more relevant in comparison with the consistency of interest dimension for collectivist cultures. Abuhassan and Bates (2015) showed that even though higher perseverance was not associated with grit, it predicted long-term achievement and they considered grit to be a univariate construct.

Finally, Credé et al. (2017) provided a meta-analytic synthesis of the grit literature. They explored grit as a predictor of success and performance and found out that grit is only moderately associated with academic performance and that perseverance, as one of two facets of grit, is more promising in explaining students’ outcomes. They pointed out that even variables with a moderate effect can be important in high-stakes assessment.

Self-efficacy – “the conviction that one can successfully execute the behaviour required to produce the outcomes” (Bandura 1977: 193) – has probably been studied most intensively since the late seventies. The research stemmed from Bandura’s social cognitive theory, which states that self-efficacy determines subsequent behaviour (Bandura 1999). Self-efficacy has been found to be a fair predictor of academic achievement (e.g. Pajares 2003, Richardson et al. 2012; Komarraju – Nadler 2013, Putwain et al. 2013). Moreover, perceived student self-efficacy has been proven to be a stronger predictor of career choice than academic achievement (Bandura et al. 2001).

Educational aspirations are important for the choice of one’s educational career and consequently also for career choice. They are viewed as strong predictors of educational outcomes and occupational careers (e.g. Schoon – Parsons 2002). Research on aspiration showed that they are explained by psychological and social characteristics, such as students’ aptitudes, parental encouragement, and socioeconomic background (e.g. Sewell – Shah 1968), as well as by structural characteristics (e.g. Buchmann – Dalton 2002).

Low educational aspirations are generally related to students from a poorer socio-economic background and are perceived as a barrier to improving educational inequality. Recently, some studies showed that educational aspirations are relatively high, even among students from disadvantaged backgrounds (Baker et al. 2014), and there is a growing body of research

showing that the relationship between aspirations and outcomes is more complicated. In the UK, the policy of “raising aspiration” was successful but some researchers argue that an emphasis on aspiration should be replaced by a policy emphasis on the academic outcomes and expectations formed by the expectations of those close to them (Harrison – Waller 2018).

Apart from cognitive predictors of educational aspirations, researchers have also explored the predictive potential of non-cognitive factors. Among them, well-being and self-efficacy were found to be strong predictors (Hartas 2016).

In the Czech Republic, educational aspirations are very strongly predicted by socio-economic background and students’ aptitudes, and the relationships between aspiration and social origin, ability, and gender are stronger than in countries with a less stratified educational system (Matějů et al. 2007). In the period between 1989 and 2003, aspirations rose dramatically, while the direct effect of socio-economic background decreased (Matějů – Smith 2009). Nevertheless, disadvantaged students are more likely not to aspire to higher education than their peers from an advantaged background (ibid). In the Czech Republic, students’ aspirations are crucial as the decision about the educational career comes exclusively from the student himself or herself and from his/her family. The school is not expected to give any recommendations. Educational advisors usually only provide information about the offer of educational opportunities and how to apply for them.

### **Research question, data, and methods**

In this paper we focus on three non-cognitive outcomes: perseverance, self-efficacy, and educational aspirations. Self-efficacy was chosen because academic achievement can be predicted successfully with measures of self-belief, self-efficacy, and self-concept (Stankov 2013). Perseverance increases the chances of individuals enduring obstacles in their lives; for example, gritty high school juniors were more likely to graduate from high school (Eskreis-Winkler et al. 2014). Educational aspirations were chosen because of their importance for career choice. We aim at answering the question whether there is a relationship between academic optimism and non-cognitive outcomes: perseverance, self-efficacy, and educational aspirations.

The data analyzed in this study was collected in May 2016 in the context of the Czech Longitudinal Study in Education (CLOSE). In this study, classes participating in TIMSS and PIRLS 2011 were followed during their lower secondary studies. The TIMSS and PIRLS school sample was complemented by a random sample of grammar schools, because approximately one tenth of Czech students transits to grammar schools after finishing primary education in grade 5. Tests in mathematics and Czech language and questionnaires were administered to the students in grade 6 in 2012 and in grade 9 in 2016. The



questionnaires asked about students' socio-economic background and their attitudes and activities. The administration took place at school and the students worked with printed instruments.

Questionnaire batteries asking about their attitudes were administered to teachers teaching lower secondary grades in an online survey in 2016. Those teachers teaching a class that was included in the survey were included preferentially. The intensity of the interaction of selected teachers with a particular class was not identified. The authors assumed that the teachers represented shared characteristics of lower secondary staff. Only schools where at least six lower secondary teachers completed the questionnaire were included in the analysis. The limitations of this approach are discussed later.

The data set used for the analysis presented in this paper contained data from 4798 grade 9 students and 1469 teachers from 124 basic schools and 39 grammar schools.

Academic optimism (*AO*) was operationalized according to Fahy et al. (2010).<sup>8</sup> Each latent construct – self-efficacy (*SE*), trust (*TR*), and academic emphasis (*AE*) – was represented by three items in the teacher questionnaire; the level of agreement was expressed on a six-point scale.<sup>9</sup>

In the study, we focused on three non-cognitive outcomes that were operationalized in the student questionnaires: perseverance, self-efficacy, and educational aspirations. For the purposes of this study, perseverance is keeping on studying intensively even when the curriculum is difficult, with the aim being to master the content. It was measured by the following four items: When I study, I really study very hard; When I study, I continue even when the content is difficult; When I study, I try hard to master the content covered; When I study, I study the best I can. The Cronbach alpha of the scale was  $\alpha=0.774$ . The first factor extracted by principal component analysis that was used in the model explained 60.0% of the variance.

Academic self-efficacy was measured by the following 11 items: I'm sure I can understand even the most complicated texts; When I decide to learn very

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<sup>8</sup> In their recent study, Straková et al. (2017) researched both a collective measure of academic optimism with teachers testifying about "the teachers in their school" (e.g. Hoy, Tarter, & Woolfolk Hoy, 2006) and an individual measure with teachers testifying about themselves (Fahy et al. 2010). The individual measure proved to be more appropriate for the Czech environment; therefore, this study focuses on individual academic optimism.

<sup>9</sup> The components of academic optimism were represented by the following items: I can motivate students who show low interest in school work; I can get students to believe they can do well in school work; I can get children to follow classroom rules. Trust: Most of my students are honest; My students' parents are reliable; I trust my students. Academic pressure: I push my students to achieve academically; I give my students challenging work; I set high, but attainable goals for my students. The construct of academic optimism on this data set was confirmed in Straková et al. (2017). The Cronbach alpha for self-efficacy was  $\alpha = 0.759$ , for trust  $\alpha = 0.783$ , and for academic emphasis  $\alpha = 0.696$ . Intra-class correlations for individuals vary from 0.3 to 0.12, which confirmed that it is important to take into account the multi-level nature of the data. Confirmatory factor analysis showed a good fit of the model (RMSEA = 0.058; CFI = 0.931; TLI = 0.911; SRMR at the teacher level 0.07; SRMR at the school level 0.12).

difficult content, I can do it; I am sure that I can understand even the most difficult content the teacher presents; When I decide not to have bad grades, I can do it; When I decide not to have any task wrong, I can really do it; I am sure that I can achieve excellent results in written papers and tests; When I want to learn something well, I can do it; I'm sure I can handle what we study; In most school subjects my learning is fast; I am doing well in most school subjects; In most subjects, I have good results in tests and essays. The Cronbach alpha of the scale was  $\alpha=0.897$ . The first factor extracted by principal component analysis that was used in the model explained 51.4% of the variance.

Educational aspirations were operationalized through dichotomous variables derived from the application for upper secondary education submitted by the student: a) aspiration to follow a study programme concluded by the school-leaving examination enabling students to apply for higher education (technical or academic track, 83% of students), b) aspiration to pursue the academic track (24% of students). The applications are submitted by basic school students in the ninth grade. This analysis was thus carried out only for students attending basic schools.

Socio-economic status (*ses*) was constructed from the following variables:<sup>10</sup>  
*books*: number of books at home – six categories (0-10, 11-25, 26-100, 101-200, 201-500, more than 500)

*sumedu*: total of mother's and father's highest education – each measured with four categories (basic, secondary without the "maturita" secondary leaving examination, secondary with the "maturita" secondary leaving examination, higher education)

*sumoccu*: total of mother's and father's occupations – each measured with nine categories (the first digit of the ISCO code in reverse order).

The composition of the index of socio-economic status from the above-mentioned variables is widely used in international comparative studies of student achievement. We chose the same procedure, although we are aware of its limitations, because attempting to obtain other variables such as parental income or family wealth traditionally encounters major resistance in schools and endangers response rates.

Structural equation modelling was conducted to analyze the relationship between academic optimism and three non-cognitive outcomes. We used a two-level model that included the school level and the individual level. The two-level model was used because we wanted to distinguish between the factors working at the school level and the factors working at the individual

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<sup>10</sup> There were 14 % of missing values in this variable; no special procedure was implemented to treat missing data.

level. In most of the participating schools only one class was included in the study.

At the individual level, we included socio-economic status (*ses*), which was composed of the above-mentioned variables *books*, *sumedu*, and *sumoccu*. At the school level the socio-economic status of the school was included; this was aggregated directly in the model from the parameters at the individual level. At the school level the dichotomous variable *type*, which characterized the type of school, was also included (0 – basic school, 1 – grammar school) in the first two models.

The latent variable *AO* was created from the three latent variables SE, TR, and AE, which were saturated by the average responses from teachers of particular schools on the nine items (three items per latent variable). Descriptive statistics of the variables included in the model are given in the appendix.

The computations were carried out in MPlus. The parameters were estimated by *maximum likelihood estimation with robust standard errors*. The quality of the models with continuous outcome variables was evaluated by the RMSEA,<sup>11</sup> TLI and CFI<sup>12</sup> and SRMR<sup>13</sup> indices.

## Results

To study the relationships between non-cognitive outcomes and academic optimism, we constructed a two-level model. There were several reasons to apply multilevel modelling. First of all, the respondents were sampled not randomly but through schools, which means that there are similarities between students in individual schools that should be taken into account. The second reason is that previous studies showed that academic optimism, although measured as a characteristic of individual teachers, works primarily at the school level, as a school characteristic (Straková et al. 2017).

However, we need to know whether the dependent variables differ between individual schools and whether it thus makes sense to explain them by school-level variables. The intra-class correlation coefficient, which shows the ratio of the variance between schools to the variance between schools plus variance between students within schools, is 4% for perseverance and self-efficacy. This

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<sup>11</sup> The *root mean square error of approximation* shows the correspondence between the model and population covariance matrix. Hu and Bentler (1999) set the maximum value for satisfactory models to RMSEA = 0.06.

<sup>12</sup> The *Tucker-Lewis index* or *TLI* evaluates the model on the basis of a comparison between  $\chi^2$  of the model and  $\chi^2$  of the null model. The *Comparative Fit index* or *CFI* is analogical to TLI but takes into account the sample size. Hu and Bentler (1999) regard the values TLI and CFI > 0.9 as evidence of a good model fit.

<sup>13</sup> The *standardized root mean square residual* is the square root of the difference of the residuals of the covariance matrix and the hypothetical covariance model. Values of 0.5 and lower indicate a good fit (e.g. Byrne 1998).

means that about 4% of the variance in these non-cognitive outcomes could be explained by differences between individual schools. The proportion of students aspiring to a study programme with the school-leaving examination ranges from 0% to 100%; the proportion of students aspiring to the academic track ranges from 0% to 80%.

First of all, we studied the relationship between perseverance and academic optimism. The model (see Figure 1) showed a good fit with the data: RMSEA = 0.017, CFI = 0.965, TLI = 0.953, SRMR within = 0.024, and SRMR between = 0.081.

The model shows a statistically significant relationship between perseverance and socio-economic status at the individual level and a significant relationship between socio-economic status and academic optimism and school type at the school level. There was, however, no statistically significant relationship between academic optimism and perseverance. This means that teacher attitudes are not related to student perseverance. Perseverance at the school level was statistically significantly related neither to school type nor to socio-economic status.

Figure 2 shows the model for self-efficacy. This model again shows a good fit with the data: RMSEA = 0.019, CFI = 0.960, TLI = 0.947, SRMR within = 0.029, and SRMR between = 0.078. As in the previous case, the model indicates a statistically significant relationship between the non-cognitive outcome and socio-economic status at the individual level and a significant relationship between socio-economic status and academic optimism and school type at the school level. In this case, the model also indicates a statistically significant relationship between academic optimism and self-efficacy. We can interpret it as an impact of teacher attitudes on student self-efficacy, irrespective of the composition of the student body and school type. We can also see it as an indirect effect of the composition of the student body, where teachers teaching students from a better socio-economic background tend to have more positive attitudes and their attitudes, conversely, contribute to student self-efficacy. In this model too, self-efficacy is not statistically significantly related to school type or to the socio-economic status of the school.

Figure 3 shows a model for aspirations to follow the academic track for students in basic schools. In this model the dependent variable is dichotomic and the school type variable is not included in the model because all students study at basic schools. Here we notice a statistically significant relationship between the non-cognitive outcome and socio-economic status at both student and school levels. The relationship between aspirations and academic optimism is, however, not statistically significant. The model with the dependent variable

aspiration to follow a programme with the school-leaving examination exhibits very similar characteristics and thus has not been included.

Figure 1: **Two-level structural model of the relationship between perseverance and academic optimism** (standardized coefficients)

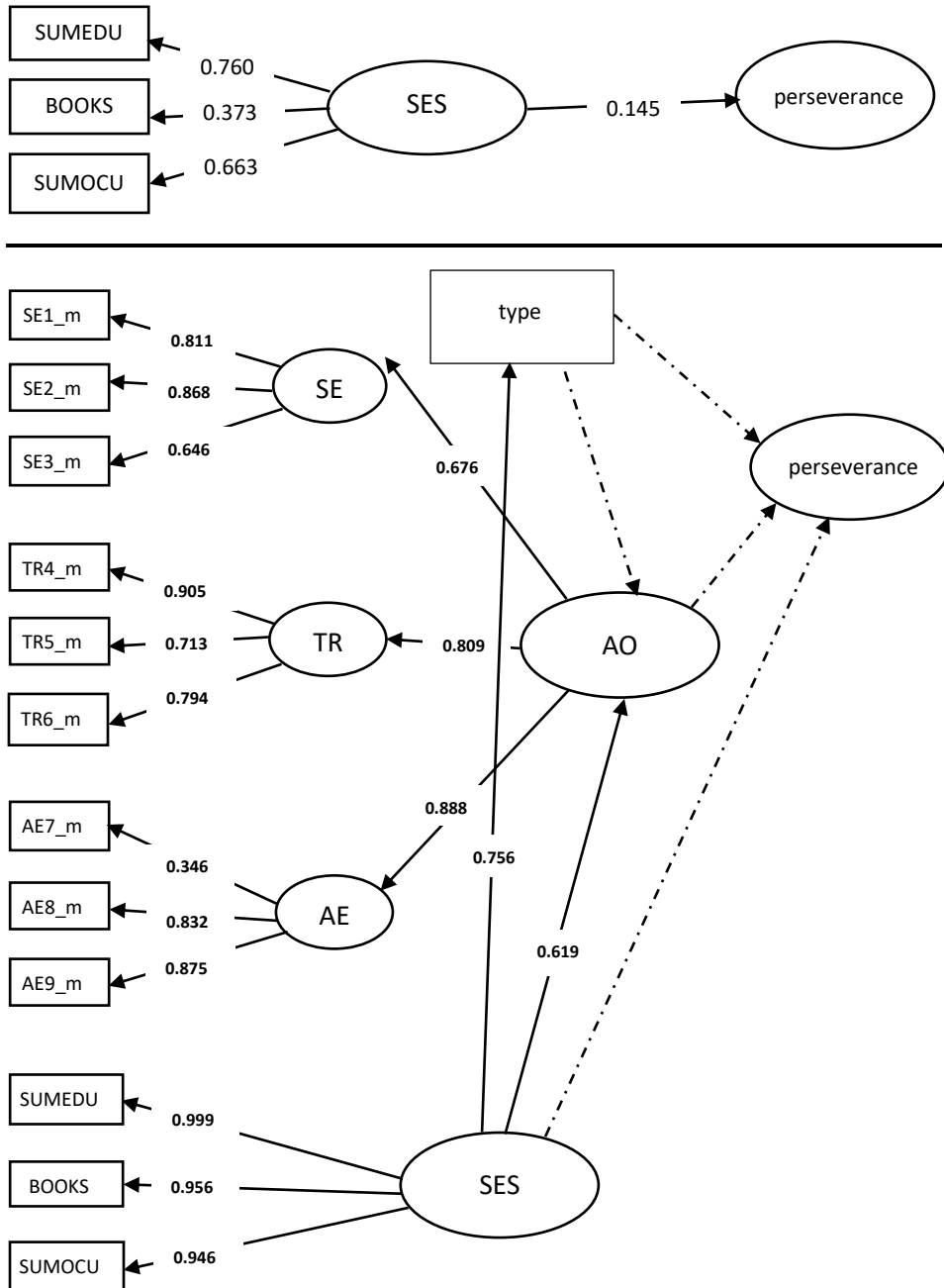


Figure 2: Two-level structural model of the relationship between self-efficacy and academic optimism (standardized coefficients)

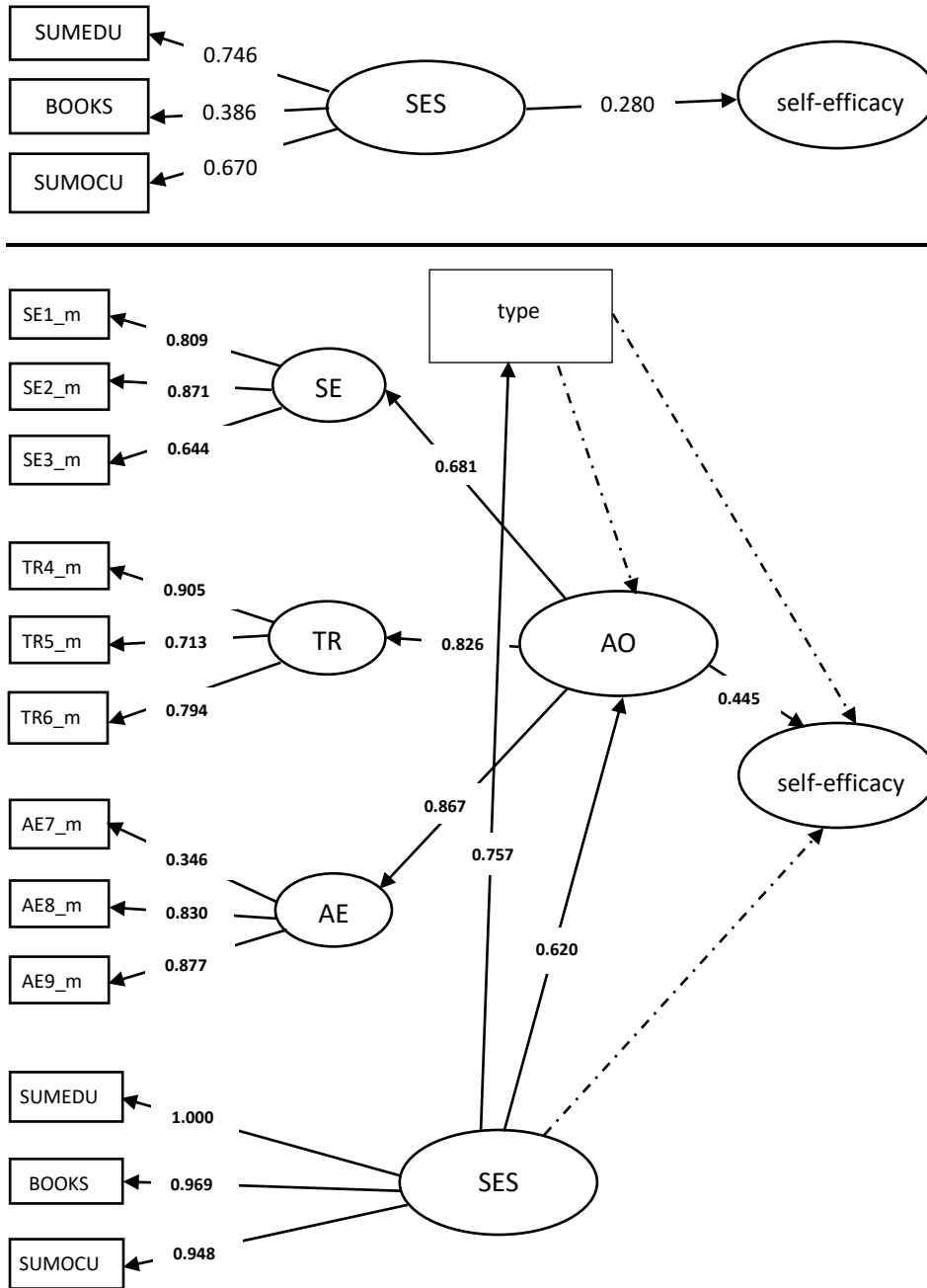
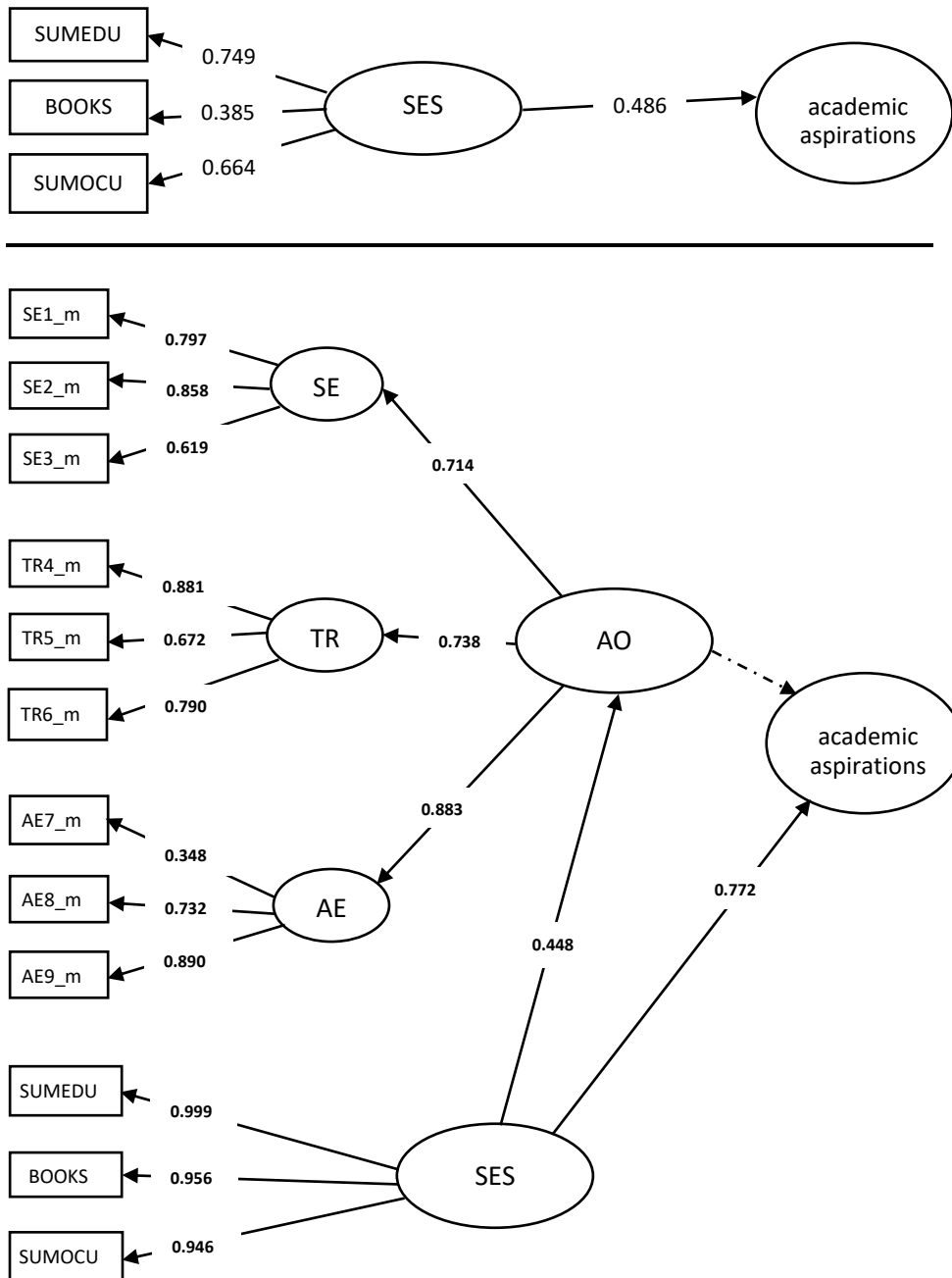


Figure 3: Two-level structural model of the relationship between aspiration to follow the academic track and academic optimism (standardized coefficients)



## Discussion and conclusions

The analyses show that at the individual level, all three non-cognitive outcomes are related to student socio-economic status. At the school level, there is a strong relationship between the socio-economic composition of the school and the school type and academic optimism. It means that in schools with students coming from more favourable home backgrounds teachers have more positive attitudes. That, however, can be a two-way relationship. Teachers with higher academic optimism have better self-efficacy and are more able to motivate students and trust them and their parents that the students are willing to work hard and therefore they can set higher expectations. On the other hand, in schools with students from better socioeconomic backgrounds with better academic outcomes it is easier for teachers to have higher self-efficacy and more trust and therefore to set higher expectations.

The facts that non-cognitive outcomes are related to student socioeconomic status at the individual level and that there is a strong relationship between the socioeconomic composition of a school and academic optimism should serve as a warning for policy makers. As previous research showed, students in different schools have different chances of succeeding even though their abilities are similar. These findings question the effectiveness of the education policy in the Czech Republic which allows parents to choose a primary school for their child and consequently tolerate the establishment of schools with different student bodies according to students' social status. This arrangement enables the growing differentiation of the school system. To solve this problem arising from free school choice does not require school choice to be banned. Nevertheless, it calls for more intense regulation with regard to school choice policy and school effectiveness. The standard of teaching quality that was expected to improve school effectiveness, however, was repeatedly turned down in the Czech Republic.

Thus, in future research, it would be interesting to look at the dynamics of the relationships between academic optimism and socioeconomic background in more detail to identify important causal mechanisms and pathways through which socioeconomic background may influence the processes in schools. One of the potential mediators could be a sense of closeness to the teacher, which influences perceived engagement in the classroom (Summers et al. 2017) or a sense of academic futility, which is more intensive in schools with within-school tracking (Van Houtte – Stevens 2015).

Teacher attitudes were found not to be related to perseverance or educational aspirations. The second model, however, indicates a statistically significant relationship between academic optimism and self-efficacy. As Moghari et al. (2011) noted, the relationship between a teacher's academic



optimism (especially their trust) and students' self-efficacy could be two-fold: a teacher's trust in students can lead the students to higher self-efficacy and that leads to more effort and ultimately to better outcomes that reinforce the teacher's academic optimism.

The reasons why perseverance and educational aspirations were not found to be related to academic optimism could lie in the characteristics of academic optimism, which includes the concept of self-efficacy. We can hypothesize that a teacher with better self-efficacy can support (even unconsciously) the self-efficacy of their students.

Previous research (Straková et al. 2018) shows that academic optimism is directly related to both mathematics achievement and class composition. This study shows the same pattern with respect to self-efficacy. These are very important findings with respect to tracking practices in the Czech education system since they exhibit not only early tracking but also a strong differentiation within individual tracks according to socio-economic status. If we interpret the results as an indirect effect of class composition we can say that students attending selective classes enjoy teachers with more positive attitudes that also support their self-efficacy. This is another serious argument for requesting consistent monitoring of the differentiation in the education system and the promotion of measures aiming at weakening it. Even though the professional and the general public in the Czech Republic are aware of the existence of educational inequalities, they underestimate the impacts, which concern not only the cognitive but also the affective outcomes of education. Our task is to show in the forthcoming analyses the extent to which self-efficacy relates to cognitive outcomes. This study gives only preliminary insights into the relationship between class composition, teacher beliefs, and student outcomes. Future research will focus on studying the relationship between cognitive and non-cognitive outcomes.

A vast body of research has explored the relationship between them. The dispute over the direction of the influence and mediated paths has been omnipresent since the beginning. While some authors claimed that prior self-efficacy influences attainment (for a review see Klassen – Usher 2010), others have put forward evidence to suggest the opposite relationship. However, the research that explored not only the correlation but also the directions showed that achievement had a significantly greater effect on self-efficacy than self-efficacy on performance (Talsma et al. 2018).

Our study has confirmed that teachers' attitudes matter. Students benefit from a teacher's academic optimism and the attitudes of teachers who set high academic standards, trust their students, and believe that they can teach even

students who are not motivated are mirrored both in the cognitive and non-cognitive outcomes of students<sup>14</sup>. As many researchers have already shown, teachers' attitudes are also malleable (e.g. Hourigan et al. 2016; Van Aalderen-Smeets – Van Der Molen 2015) and therefore initial and in-training teacher education should focus on finding ways to improve teachers' academic optimism. The fact that classroom experiences are as important as theoretical knowledge for achieving higher self-efficacy (Giallo – Little 2003) could also be inspiring. Several studies have also shown the importance of leadership for academic optimism. Teachers' academic optimism can be positively influenced by distributed leadership (Chang 2011), authentic leadership (Kulophas et al. 2018), or social justice leadership (Feng – Chen 2018).

On the other hand, as Kennedy (2010) pointed out, there is a tendency to overestimate the influence of internal psychological characteristics and to underestimate the influence of the characteristics of the concrete situation on behaviour. Future research should focus on overcoming this gap in our understanding of the size effect of the particular characteristics and try to distinguish the influence of teachers' characteristics and the influence of the attributes of particular unique situations.

In the Czech Republic, the quality of teachers' performance and their attitudes have recently been most often discussed in relation to teacher salaries. The research, however, shows that incentives do not bring about an improvement automatically (e.g. Aravena et al. 2018). It is therefore necessary, together with a salary increase, to focus on careful selection of teachers, their better education and training, and excellent leadership.

Our study has several limitations. The most serious one concerns the selection and operationalization of non-cognitive outcomes. In our analyses, we used the available data, which included questionnaire batteries that could be used to operationalize some of the meaningful non-cognitive outcomes. If we were to carry out our own investigations, we would probably choose a different set of non-cognitive outcomes and some outputs might be operationalized in a different way. While perseverance has been operationalized through questions repeatedly used in international surveys that seem to work well in the Czech Republic, educational aspirations could be measured using more detailed questions. That is the task of our further research. This study confirmed that it is a meaningful direction of research but that the cognitive outcomes have to be carefully selected.

As we have data from a cross-sectional study, we cannot draw any causal inferences. We thus can speak only about the relationships between the

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<sup>14</sup> This could also be well demonstrated through programmes such as Teach for Slovakia, where teachers' attitudes belong among the most important prerequisites for success (<https://teachforslovakia.sk/news/>).

variables under study. To study the impact of academic optimism on self-efficacy rigorously, we would need to use a longitudinal design.

Another limitation of our study is the loose relationship between the teachers and the students. We do not relate teachers to individual students, nor to individual classes, and assume that teachers express some shared values and attitudes that are typical of an individual school. This assumption is correct only to some extent, as shown by the values of the ICC coefficients of individual components of the latent construct of academic optimism.

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## Annex

Table P1: **Variables included in the analysis**

	N	Minimum	Maximum	weighted		unweighted	
				Mean	Std. deviation	Mean	Std. deviation
sumocu	4188	2.00	18.00	11.87	3.86	11.33	3.90
sumedu	4581	2.00	8.00	6.05	1.37	5.84	1.34
books	4756	1.00	6.00	3.79	1.39	3.60	1.37
persev	4744	-1.96	2.81	-0.01	1.00	-0.02	1.00
self	4690	-2.16	3.31	-0.04	1.00	0.01	1.00
asp_ac	3387	0.00	1.00	0.86	0.35	0.86	0.35
asp_le	3387	0.00	1.00	0.24	0.43	0.24	0.43
TYP	4798	0.00	1.00	0.29	0.46	0.15	0.36
SE1	4798	3.00	4.88	4.10	0.38	4.07	0.38
SE2	4798	3.57	5.20	4.51	0.29	4.49	0.31
SE3	4798	4.00	5.33	4.84	0.27	4.82	0.28
TR1	4798	3.40	5.50	4.70	0.40	4.64	0.39
TR2	4798	2.83	5.29	4.23	0.39	4.18	0.42
TR3	4798	3.50	5.40	4.72	0.36	4.69	0.36
AE1	4798	3.83	5.71	4.96	0.30	4.96	0.31
AE2	4798	2.67	5.29	4.19	0.47	4.09	0.45
AE3	4798	3.50	5.63	4.55	0.38	4.49	0.37