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STUDY

ACHIEVEMENT IN THE LIGHT OF ASPECTS OF STUDENT WELL-BEING AND TEACHER ATTITUDES: THE CASE OF SLOVENIA

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ABSTRACT

Although many countries experienced negative trends in the 2022 cycle of PISA results, results for Slovenia showed an alarmingly negative trend in mathematics, reading, and science achievement on PISA literacy scales, and at the same time a decline in several aspects of student well-being. According to research evidence on the relatedness of knowledge and well-being, some studies have already confirmed student well-being as an important predictor of academic achievement. In the study, we focus on the differences in relationships between knowledge and aspects of student and teacher well-being in various secondary education programs. The survey results show that students and teachers in technical and vocational education programs report lower levels of some aspects of well-being, and that in explaining achievement in mathematics, reading and science, the most significant predictors across all education programs proved to be the quality of student-teacher relationships. The results suggest that by empowering teachers we can foster learning environments that support students from different backgrounds and as such enhance more positive student outcomes.

KEYWORDS

academic achievement; student well-being; teacher well-being; student outcomes

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Introduction

The recent findings from PISA 2022 for Slovenia reveal a concerning trajectory, characterized by a notable regression in mathematics, reading, and science proficiency, as documented by the OECD (2023a). The same cycle of PISA also reported several dimensions of student well-being (Šterman Ivančič & Mlekuž, 2023). This enables us to gain insight into the nature of educational outcomes and their association with other factors.

Researchers described the impact of teacher "quality" and "opportunity to learn" on student performance as modest, implying the existence of additional determinants (Carnoy et al., 2016). At the same time, the role of educators and the broader educational background warrants attention, as stated by Burris (2012), who attributes lower student performance in the U.S. to deficiencies in pedagogical training, learning environments, and the erosion of trust in teaching professionals. This is similar to Braun (2008), who states that successful educational systems are characterized by strong interrelations between student performance, school contexts, and classroom practices.

According to Baumert et al. (2009), large-scale assessments such as TIMSS and PISA measure the intricate processes of knowledge acquisition rather than solely assessing cognitive faculties. This means that those outcomes do not depend only on individual student characteristics outside the scope of teachers and schools, but rather include those as well. This means that students' outcomes do not depend only on individual student characteristics outside the scope of teachers and schools, but rather include characteristics of processes of knowledge acquisition as well.

That is why the decline in academic achievement in Slovenia necessitates a holistic outlook on many factors influencing student outcomes, including aspects of a teacher-student relationship, students' feelings of safety, belonging to school, and their self-oriented beliefs.

The role of **teacher-student relationships** in shaping both academic performance and student well-being has been extensively documented in educational research. Van Petegem et al. (2007) report a positive correlation between student well-being and interpersonal teacher behavior, emphasizing the profound influence that teacher-student dynamics have on student motivation and classroom climate. Similarly, Mikk et al. (2016) highlight the weak yet positive relationship between teacher-student relations and student motivation and academic performance. They stress the significance of fostering positive teacher-student interactions as a means to enhance overall school performance.

Perceived teacher competencies play a crucial role in shaping student emotions and well-being within educational contexts, particularly in subject-specific instruction. Gläser-Zikuda and Fuß (2008) report the impact of

perceived teacher competencies on student emotions in physics instruction. McGrath and Bergen (2015) report the nature of student-teacher relationships by identifying various factors such as student characteristics, periods of schooling at risk, and previous attachment relationships that influence the dynamics of these relationships.

The empirical evidence suggests that the quality of teacher-student relationship can serve as a predictor of academic outcomes and socio-emotional well-being among students. Hughes (2011) observes the longitudinal effects of teacher-student relationships on academic adjustment, revealing that high-quality teacher-student relationships predict positive academic self-images, behavioral engagement, and achievement in subsequent years. Importantly, student reports of teacher-student relationships predict feelings of school belonging and math achievement. By fostering positive teacher-student relationships we could promote both academic success and socio-emotional well-being of students.

Feeling safe within the school environment is another critical factor that influences both academic performance and well-being. School climate, staff actions, and interpersonal relationships all contribute to creating a sense of safety for students and faculty alike (Bosworth et al., 2011). Positive student-teacher relations, consistent disciplinary practices, and a supportive school community are essential components in fostering feelings of safety (Williams et al., 2018). Feeling safe is also important in the context of bullying, a closely connected concept that contributes to well-being (Volk et al., 2017). Importantly, perceptions of safety are not uniform across student groups, with variations observed based on gender, ethnicity, and socioeconomic status (Siann et al., 1994). Because of that, efforts to enhance school safety must consider the diverse needs and experiences of all students.

The concept of **school belonging** also emerges as a predictor of academic achievement and socio-emotional outcomes. Students who feel connected to their school community exhibit higher levels of motivation, engagement, and academic performance (Korpershoek et al., 2020). A sense of belonging is particularly crucial for students at risk of dropout, as it serves as a protective factor against disengagement and academic failure (Goodenow & Grady, 1993). Additionally, school belonging is positively associated with final-semester academic grades (Roeser et al., 1996). However, there are differences in the prevalence of school belonging across students with different socio-economic backgrounds, with higher levels observed in schools serving middle and high socio-economic status populations (Sari, 2012).

1 Contemporary studies

In Slovenia, international independent studies such as PISA, TALIS, and TIMSS consistently identify problems with the quality of relations in schools and attitudes toward learning. According to the latest PISA report, student achievement is declining, with a continuing downward trend in many students' attitudes toward learning, school, and relations. To improve both, focused research on the relationship between attitudes and knowledge is needed within the existing national initiative to provide a safe and supportive learning environment for all students.

Upper secondary education in Slovenia is tracked, and students are enrolled in programs of their own choice. Tracking leads to different future career decisions and therefore some differences across levels and types of programs or secondary schools are to be expected. The practice of tracking in several educational systems has gained attention due to its perceived influence on student outcomes and social inequalities. Research by Strello et al. (2021) indicates that while tracking may exacerbate social achievement gaps and dispersion inequalities, it does not necessarily lead to improved performance levels in assessments such as PISA or TIMSS. This suggests that early tracking may contribute to widening disparities in student achievement without yielding commensurate gains in academic proficiency across different tracks.

In their overview, Strello et al. (2021) note that the implications of early tracking extend to the differential experiences and opportunities afforded to students in different tracks. While some argue that tracking allows for tailored instruction and targeted support, others caution against the perpetuation of inequalities and limited mobility between tracks. The delineation of students into distinct tracks based on perceived ability or aptitude may inadvertently reinforce socio-economic disparities and limit upward mobility for students from disadvantaged backgrounds.

The effects of early tracking extend beyond academic performance and include learning inequalities, particularly in reading literacy. Contini and Cugnata (2020) highlight the role of early tracking in increasing overall inequalities and amplifying differences based on family background in reading literacy, as evidenced by assessments like PISA and PIRLS.

In Slovenia, the system of upper secondary education is divided into three main educational programs. The academic track, represented by the program of general gymnasium, leads directly to university study and it is the most demanding four-year education course with the same curriculum for all future university students. Technical education programs offer a path to tertiary non-university study courses and provide certificates for different professions in the form of four-year programs. Vocational programs of four years or medium duration include longer and shorter programs oriented at vocations

and do not provide direct access to tertiary education. A secondary school can offer either only the program of general gymnasium or more programs and tracks of technical education or a combination of technical and vocational programs. Students choose the secondary school and program at the end of grade 9 of elementary school, according to their educational motivation and achievement at the end of compulsory schooling. A majority of students stay enrolled in the same program and school to the end of their secondary education. Following the findings in the research literature, upper secondary schools from different educational programs are expected to differ in their general school climate, formed by the motivation and characteristics of enrolled students as well as teachers and teaching.

The main aims of our study were to better understand the link between achievement and student attitudes and to discover the factors that most strongly affect achievement across secondary school student populations. Due to tracking in Slovenia, the basic hypothesis was that schools from different educational programs differ in terms of student population characteristics, attitudes, and knowledge. Consequently, specific approaches or actions would be needed to improve the situation at the school level. Given the research problem described above, the study aims to answer two fundamental research questions:

1. How do various aspects of student well-being and achievement, as well as teacher attitudes, vary across different educational programs?
2. What are the most significant predictors of student well-being in different educational programs?

Our study for the first time combines research findings for Slovenia from two different international comparative studies, focused on two different educational levels. Students' reports about their knowledge and attitudes are combined with teachers' reports on teaching the same student population. The study fills the gap in research on teaching the population of 15-year-old-students and the specific educational problem, motivation for learning, from both educational levels, students and teachers. The main research interest—not only to describe in general, but to find differences within secondary education, between different school programs in order to inform the national educational system about how to adapt policies to different programs, is very hard to find in contemporary research literature.

2 Data and methods

Ideally, the study of relations between students and teachers would use data sources from both teachers and students. Unfortunately, the PISA study does not collect teacher data. To still study the problem from both sides, we linked

the results from the two studies. To describe the problem and background of research questions, a descriptive analysis of the OECD Teaching and Learning International Survey (TALIS) data from teachers in Slovenia, collected in 2018, was used in the first step of our research. To find answers to the research questions, secondary analyses of the OECD PISA data from students in Slovenia, collected in 2022 have been applied. Both studies reported on relations between teachers and students, while TALIS also described school climate and PISA measured the achievement of students. The method (participants, instruments, and data analysis) is explained in detail in the following paragraphs.

2.1 Samples

The OECD Teaching and Learning International Survey (TALIS) in 2018 collected reports from more than 40 populations of teachers in ISCED 2 programs, and provided an optional additional collection of all data in the population of ISCED 3 program teachers. Slovenia participated in ISCED 2 and ISCED 3 modules in TALIS 2018, where the population of ISCED 3 consists exclusively of teachers in Slovene upper secondary schools. All secondary schools were included in the survey due to the fact that the total number of secondary schools in Slovenia is smaller than the internationally required school sample size. Within each school, a set of 30 teachers was sampled, or all teachers if there were fewer than 30 employed in a school. Teachers replied to the online questionnaire in the spring 2018. As stated above, the majority of schools offer more than one educational program to their students. Since teachers in a particular school can teach in different educational programs offered by the school, they are not assigned to a specific program but rather to the school itself. To compare data among different programs, for this study, all participating schools and their teachers were assigned to three general educational program groups based on which of the three programs the majority of students inside the school are enrolled in: general gymnasia, technical education programs, and vocational education programs. Statistics reveal that almost one-third of teachers come from schools providing the most advanced academic program of general gymnasia, which offers students the general Higher School Certificate examination and entry to academic university studies. A quarter of teachers teach in schools where most students are enrolled in vocational programs of shorter duration (less than 4 years). The remaining 44% of teachers work in technical secondary schools that provide different programs with vocational Higher School Certificate examinations for students, leading to non-academic university or tertiary education (Table 1).

Table 1
Distribution of teachers into three groups of schools by educational programs

Educational programs	Weighted *N*	% of teachers	% of teachers *SE*
General gymnasia	1592	31.61	0.36
Technical education	2340	44.36	0.38
Vocational education	1293	24.03	0.37

The population for the PISA study in Slovenia includes all male and female students aged between 15 years and 3 months and 16 years and 2 months, regardless of the educational program they attend. Sampling in the PISA survey is multi-level and stratified. In Slovenia, the sample includes all secondary education schools. The sample in the analysis includes a representative sample of 5,591 15-year-old male and female students, of which 2,591 (49.5%) are female and 3,000 (50.6%) are male. Of the students sampled 1,486 (34.5%) students attended a program of general gymnasia, 2,766 (48.8%) attended programs of technical education, and 1,339 (16.7%) attended vocational education programs of medium duration. In general gymnasia, there were 910 (62.0%) females and 576 (38.0%) males, in technical education programs 1,286 (47.8%) females and 1,480 (52.2%) males, and in programs of vocational education of medium duration 395 (28.2%) females and 944 (71.8%) males.

2.2 Instruments and variables

The TALIS questionnaire contained questions for measuring attitudes of teachers, asking one general question about their attitude, followed by precise questions or statements in the context of the same factor. The reported answers were internationally modelled by IRT method into scales called teacher indices. The values of indices were included in the internationally available public database of TALIS 2018. For our study, we used five teacher self-reporting scales on relations between teachers and students: *Teacher-student relations* (STUD) (e.g., agreement with teachers and students usually get on well with each other; teachers believe that the students' well-being is important; teachers are interested in what students have to say); *Social utility motivation to teach* (SOCUT) (e.g., importance of teaching to influence the development of children and young people; to benefit the socially disadvantaged; to provide a contribution to society); Index *Classroom management* (CLASM) (e.g., frequency of telling students to follow classroom rules; of telling them to listen to teachers; of calming students who are disruptive; of quietening students down at the beginning of the lessons); *Student behavior stress* (STBEH) (e.g., level of stress because of being responsible for students' achievement; maintaining classroom discipline; being intimidated or verbally abused by

students); *Teachers perceived disciplinary climate* (DISC) (e.g., to what extent do they have to wait a long time for students to quiet down; do students create a pleasant learning atmosphere; is a lot of time lost because students interrupt the lesson; is there much disruptive noise in the classroom). Detailed descriptions of scales are available in the TALIS 2018 Technical Report (OECD, 2019).

TALIS scales have a mean of 10 and a standard deviation of 2. Scores on scales greater than 10 indicate average or higher agreement with the items of the scale (such as "frequently" or "always"). Scores lower than 10 indicate average disagreement or less with the items in the scale (such as "not at all" or "to some extent"). All the scales showed good measurement characteristics for the Slovenian sample (omega statistics are 0,774 for STUD; 0.789 for SOCUT; 0.769 for STBEH and 0.878 for DISC and Cronbach's alpha for CLASM is 0.865; see Stancel-Piątak et al., 2019).

After a two-hour PISA 2022 reading, mathematics, and science literacy assessment, students completed the student questionnaire, which is used to identify the effects of different background factors on student achievement. For the analysis, we used separate student self-reported well-being scales: Quality of student-teacher relationships (QUALITY) (e.g., "The teachers at my school are respectful towards me", "The teachers at my school are interested in students' well-being"), Sense of belonging to school (BELONG) (e.g., "I feel like an outsider (or left out of things) at school", "I feel like I belong at school"), Frequency of being bullied (BULLIED) (e.g., "Other students left me out of things on purpose", "Other students took away or destroyed things that belonged to me"), and Feeling of being safe at school and outside school (FEELSAFE) (e.g., "I feel safe on my way to school", "I feel safe on my way home from school"). Students responded to 27 statements altogether[1]. All the mentioned scales and corresponding items are described in detail in the PISA 2022 Technical Report (OECD, 2023b). All the scales showed good internal consistency for the Slovenian sample, with the coefficient alpha values ranging between $\alpha = 0.74$ and $\alpha = 0.91$ (OECD, 2023b).

Mathematics, reading, and science achievement in PISA 2022 are internationally comparable average measures of mathematics, reading, and science ability (OECD, 2023a). The average mathematics achievement of Slovenian 15-year-

[1] Due to the high number of the scales and related statements, only a few examples of the statements are given for each scale in continuation of the description of used instruments. The full scales are available in the internationally published questionnaire at the following link: https://www.oecd.org/pisa/data/2022database/CY8_202111_QST_MS_STQ_CBA_NoNotes.pdf

olds was 485 points on an International Mathematics scale, and as such significantly above the OECD average (472 points). The average reading achievement of Slovenian 15-year-olds was 469 points on an International Reading scale, and as such significantly below the OECD average (476 points). The average science achievement of Slovenian 15-year-olds was 500 points on an International Science scale, and as such significantly above the OECD average (485 points) (Šterman Ivančič & Mlekuž, 2023). However, the trend from the previous PISA cycle was negative for all three measures of achievement.

2.3 Data analysis

Mean values of selected TALIS indices STUD, SOCUT, CLASM, STBEH and DISC were calculated for three groups of teachers according to the educational programs offered by their schools. Differences between the groups were observed.

For the analysis of PISA data, we used pre-existing average values of achievement in Mathematics, Reading, and Science, and standardized values of well-being indices (i.e. perceived quality of student-teacher relationships, sense of belonging to school, frequency of being bullied, feeling of being safe)[2] for Slovenia from the PISA 2022 database. First, we compared the mean values of mathematics, reading, and science achievement, and the well-being indices with the OECD average. Since we were interested in the effects of students' perceived quality of student-teacher relationships, sense of belonging to school, frequency of being bullied, and feeling of being safe at school and outside school on students' average mathematics, reading, and science achievement, we used the linear regression procedure to further analyze the size effects. Pearson correlation coefficients were used to examine associations between the independent (BELONG, BULLIED, FEELSAFE, QUALITY) and the dependent variables (MATHEMATICS, READING, SCIENCE ACHIEVEMENT) prior to undertaking regression. We also undertook preliminary screening of the data through the examination of residuals with the scatterplot of residuals against predicted values and checked the data for multivariate outliers (Tabachnick and Fidell, 2007). No obvious pattern to the errors and no multivariate outliers were identified.

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[2] The index is a standardized value with a mean of 0 and a standard deviation of 1 and enables the comparison of Slovenian scores on a certain scale to the OECD average. Negative values of the index mean that Slovenian students on average evaluated their aspects of well-being on a certain scale lower than their peers from the OECD countries, and positive values of the index mean that their self-evaluation on a certain scale was higher.

Data from both sources underwent analysis using the statistical program IEA IDB Analyzer (Version 5.0.23). This program processes data from two-stage sampling in both studies and in the case of PISA incorporates weights for individual sample units. It also enables us to accurately assess the standard errors of estimated parameters in the population using the Bootstrap method.

3 Results

3.1 Teachers' reports about relations with students

The first part of our study focused on the background conditions in the schools. The descriptive analysis of teachers' attitudes indicates differences among these attitudes in the three groups of schools, providing more or less advanced educational programs and consequently enrolling different student populations. The means and *t*-values of comparisons between educational programs are given in the Table 2.

Table 2
Means of indices of relations between teachers and students by groups of teachers

Index	*M*	*SE*	Comparing group	*t*
STUD				
General gymnasia	13.13	0.08	Technical education	–0.88
Technical education	13.05	0.06	Vocational education	–2.36*
Vocational education	12.84	0.08	General gymnasia	2.54*
SOCUT				
General gymnasia	11.56	0.09	Technical education	3.06**
Technical education	11.94	0.07	Vocational education	–0.10
Vocational education	11.95	0.10	General gymnasia	2.93*
CLASM				
General gymnasia	10.29	0.09	Technical education	4.52***
Technical education	10.81	0.08	Vocational education	3.43***
Vocational education	11.23	0.09	General gymnasia	–7.15***
STBEH				
General gymnasia	8.65	0.08	Technical education	5.27***
Technical education	9.22	0.07	Vocational education	4.12***
Vocational education	9.71	0.09	General gymnasia	–8.85***
DISC				
General gymnasia	7.84	0.08	Technical education	3.94***
Technical education	8.24	0.07	Vocational education	4.04***
Vocational education	8.67	0.08	General gymnasia	–7.69***

Note. *$t > 1.98$, **$t > 2.68$, ***$t > 3.28$.

Results reveal expected patterns of means of indices for three groups. The teacher student relations (STUD) decrease in value from gymnasia to vocational education, while mean values of the indices social utility motivation to teach (SOCUT), classroom management (CLASM), student behavior stress (STBEH), and teachers' perceived disciplinary climate (DISC) increase from gymnasia to vocational education (Figure 1).

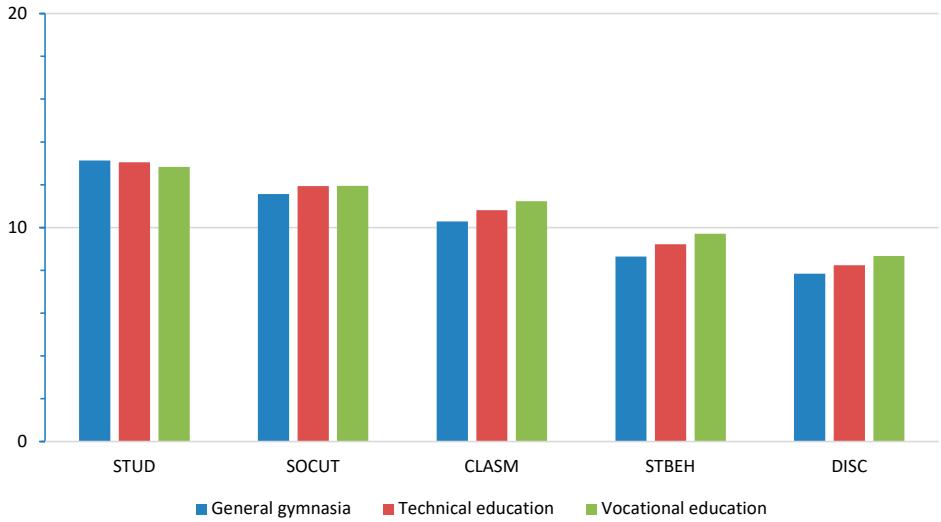

Figure 1
Means of teacher indices by educational programs

The *teacher student relations* index means are larger than the scale mean, 10 points, in all groups, showing that teachers in general agree or strongly agree with all its statements about relations. Higher index values mean better relations, so according to the results, teachers across all schools believe relations between students and teachers are good. The index differs only slightly between the groups of teachers. The *teacher student relations* are lower in vocational schools than in gymnasia and in technical schools, while they are similarly high in gymnasia and in technical schools.

Social utility motivation to teach is the lowest among teachers in gymnasia and higher in technical and vocational schools, but does not differ between them. When deciding to become teachers, teachers in gymnasia have seen the social role of teaching less as a motivating factor than their colleagues in technical and vocational schools. *The classroom management*, indicating the frequency of teachers' requests for discipline from students, shows that teachers request discipline from students in all three educational groups a

lot, frequently (or more) or in all lessons. The mean as expected increases from gymnasia through technical to vocational schools, reporting the most teacher requests for discipline in vocational schools. Teachers in these schools were also confirmed to be the most stressed because of students. The indices of *student behavior stress* and *teachers' perceived disciplinary climate* follow the same increasing pattern from gymnasia to vocational schools. Teachers in gymnasia felt the least stress and teachers in vocational schools felt the most because of being held responsible for student achievement, maintaining classroom discipline, and being intimidated or verbally abused by students. Similarly, teachers in gymnasia also reported the highest discipline in classes while in vocational schools the measured values of the index of discipline are the lowest among the three groups of schools.

In general, teachers in gymnasia reported the most positive relations with students and the fewest disciplinary issues of all three groups. Teachers in technical schools reported slightly less positive relations with students than in gymnasia, but more positive than in vocational schools. In addition, they had more disciplinary issues with students than in gymnasia but fewer than in vocational schools. The results clearly confirm differences in school climate among all three groups of schools according to their educational programs, with the most positive situation in the schools with the most advanced programs.

3.2 Student achievement

Compared to the OECD average, Slovenian 15-year-olds achieved above-average results in mathematics and science literacy in PISA 2022 (485 vs. 472 in mathematics and 500 vs. 485 in science), while in reading, the Slovenian average achievement was significantly below the OECD average (469 vs. 476).

Looking at the differences in average achievement in mathematics, reading, and science literacy by educational program (Table 3), the results show that in all three subjects, students attending gymnasia achieved the highest average scores, while students attending vocational education programs achieved the lowest.

Table 3

Average achievement in mathematics, reading, and science according to secondary educational programs

Educational programs	Mathematics		Reading		Science		
	M	*SE*	*M*	*SE*	*M*	*SE*	
General gymnasia	555.72	2.24	541.74	2.59	571.59	2.76	
Technical education	469.43	1.78	453.09	2.09	484.82	2.45	
Vocational education	407.27	2.21	383.63	3.06	419.32	3.08	

The differences in average achievement between the most and least advanced programs are quite large and significant, with 148 points in mathematical literacy, 158 points in reading literacy, and 122 points in science literacy.

3.3 Students' reports about attitudes and relations with teachers

Furthermore, compared to the OECD average, Slovenian 15-year-olds reported significantly lower-than-average quality of both student-teacher relationships and frequency of being bullied, and average levels of sense of belonging to school and feelings of being safe in school (Table 4).

Table 4
Mean standardized values of well-being indices for study variables

Student indices	*M*	*SE*
Quality of student-teacher relationships	–0.21	0.01
Sense of belonging to school	0.04	0.01
Being bullied	–0.43	0.01
Feeling safe	0.02	0.02

Note. M = Mean value of internationally comparable index – standardized value with the mean of 0 and standard deviation of 1.

Again, there are significant differences in well-being indices between educational programs (Table 5). Students attending vocational education programs of medium duration report significantly lower quality of student-teacher relationships, a lower sense of belonging to school and feelings of being safe, and slightly higher exposure to peer violence compared to students attending general gymnasium.

Table 5
Mean values of well-being indices for study variables by educational programs

Educational programs	Quality of relationships		Sense of belonging		Being bullied		Feeling safe	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
General gymnasia	–0.08	0.03	0.08	0.03	–0.58	0.02	0.17	0.03
Technical education	–0.30	0.02	0.04	0.02	–0.43	0.02	–0.06	0.02
Vocational education	–0.30	0.03	–0.06	0.03	–0.33	0.04	–0.12	0.04

Note. M = Mean value of internationally comparable index – standardized value with the mean of 0 and standard deviation of 1 (except for average mathematics, reading, and science achievement).

All variables are significantly correlated with each other at the $\alpha < 0.001$ level (Table 6), with the quality of student-teacher relationships being most strongly associated with mathematics, reading, and science achievement.

Table 6
Correlation coefficients for study variables

Study variables	1	2	3	4	5	6	*M*	*SE*
Quality of student-teacher relationships	–						–0.21	0.01
Sense of belonging to school	0.26**	–					0.04	0.01
Being bullied	–0.22**	–0.27**	–				–0.43	0.01
Feeling safe	0.20**	0.36**	–0.15**	–			0.02	0.02
Mathematics achievement	0.14**	0.06**	–0.10**	0.14**	–		485	1.20
Reading achievement	0.18**	0.07**	–0.15**	0.13**	0.77**	–	469	1.60
Science achievement	0.16**	0.06**	–0.11**	0.14**	0.89**	0.76**	500	1.40

Note. The Pearson correlation coefficient was calculated as a measure of correlation; $^{**}p < 0.001$.

In explaining mathematics achievement (Table 7), the main significant predictors were the feeling of safety at school and the quality of student-teacher relationships, both in the general gymnasium and the technical education program. In the latter, the effect size of the quality of student-teacher relationships in explaining mathematics achievement is the largest. In the vocational education program of medium duration, none of the predictors was found to be significant in predicting mathematics achievement. The explanatory power of the model is low within all three educational programs ($R^2 = 0.03$ for general gymnasium, 0.02 for technical education programs, and 0.00 for vocational education programs of medium duration).

Table 7
Regression of association between different aspects of student well-being and mathematics achievement in three types of educational programs

Mathematics achievement					
Model	*B*	SE_B	β	t_B	*p*
General gymnasia					
Constant	554.50	2.88		192.72	0.00
Belong	–6.30	3.11	–0.08	–2.03	0.05
Bullied	–2.81	2.89	–0.03	–0.97	>0.05
Feel safe	9.79	2.61	0.13	3.75	0.00
Quality	9.14	2.33	0.12	3.92	0.00
Technical education					
Constant	471.32	2.11		223.40	0.00
Belong	–0.07	2.46	0.00	–0.03	>0.05
Bullied	3.05	1.76	–0.04	–1.74	>0.05
Feel safe	5.08	2.05	0.07	2.48	0.05
Quality	5.39	2.04	0.07	2.64	0.01
Vocational education					
Constant	410.98	2.58		159.23	0.00
Belong	0.72	2.39	0.00	0.30	>0.05
Bullied	–1.04	2.13	–0.04	–0.49	>0.05
Feel safe	–0.49	2.40	0.07	–0.20	>0.05
Quality	3.35	2.29	0.07	1.46	>0.05

Note. R^2 adjusted = 0.03 for general gymnasium; 0.02 for technical education programs; 0.00 for vocational education programs of medium duration.

In predicting achievement in reading (Table 8), the main predictors confirmed as significant across the three educational programs were the frequency of experiencing peer violence and the quality of student-teacher relationships, with the latter predictor having the largest effect in explaining achievement in reading amongst all three literacies. Again, the explanatory power of the model is low, but the highest of all three literacies (R^2 = 0.04 for general gymnasium, 0.03 for technical education programs, and 0.05 for vocational education programs of medium duration).

Table 8
Regression of association between different aspects of student well-being and reading achievement in three types of educational programs

Reading achievement					
Model	*B*	SE_B	β	t_B	*p*
General gymnasia					
Constant	538.24	3.10		173.59	0.00
Belong	–5.38	3.39	–0.07	–1.72	>0.05
Bullied	–8.24	2.87	–0.10	–2.87	0.01
Feel safe	8.19	2.74	0.10	2.99	0.01
Quality	10.26	3.32	0.13	3.08	0.01
Technical education					
Constant	456.23	2.44		187.30	0.00
Belong	–0.73	2.49	–0.01	–0.29	>0.05
Bullied	–6.64	1.96	–0.09	–3.38	0.00
Feel safe	2.29	2.31	0.03	0.99	>0.05
Quality	10.96	2.43	0.13	4.50	0.00
Vocational education					
Constant	389.83	3.33		117.11	0.00
Belong	3.99	3.01	0.05	1.33	>0.05
Bullied	–4.85	2.42	–0.08	–2.00	0.05
Feel safe	–1.76	3.12	–0.02	–0.56	>0.05
Quality	12.50	3.14	0.17	3.98	0.00

Note. R^2adjusted = 0.04 for general gymnasium; 0.03 for technical education programs; 0.05 for vocational education programs of medium duration.

In explaining achievement in science (Table 9), the quality of student-teacher relationships was also confirmed as a significant predictor of science achievement across all three educational programs, with a sense of safety at school also confirmed as a significant predictor in the general gymnasia and vocational education programs. The highest portion of the variability in science achievement is explained within the general gymnasium program, but the explanatory power of the model is low (R^2 = 0.04 for general gymnasia, 0.02 for technical education programs, and 0.02 for vocational education).

Table 9
Regression of association between different aspects of student well-being and science achievement in three types of educational programs

Science achievement					
Model	*B*	SE_B	β	t_B	*p*
General gymnasia					
Constant	570.83	3.07		185.64	0.00
Belong	–4.95	3.16	–0.06	–1.57	>0.05
Bullied	–2.79	2.76	–0.03	–1.01	>0.05
Feel safe	9.66	3.00	0.12	3.21	0.00
Quality	10.56	3.02	0.13	3.50	0.00
Technical education					
Constant	487.86	2.57		189.64	0.00
Belong	–0.88	3.17	–0.01	–0.28	>0.05
Bullied	–3.07	2.01	–0.04	–1.52	>0.05
Feel safe	5.14	2.60	0.06	1.97	0.05
Quality	8.08	2.28	0.10	3.54	0.00
Vocational education					
Constant	423.63	3.21		131.84	0.00
Belong	–0.01	2.91	0.00	0.00	>0.05
Bullied	–5.30	2.41	–0.09	–2.20	0.05
Feel safe	0.73	2.89	0.01	0.25	>0.05
Quality	6.59	2.52	0.09	2.62	0.01

Note. R^2adjusted = 0.04 for general gymnasium; 0.02 for technical education programs; 0.02 for vocational education programs of medium duration.

4 Discussion

The teacher-student relations as measured through teachers' responses appear high (above international average) with differences across educational programs. At the same time students report somewhat more critically, their mean values in all programs are below international averages. This discrepancy allows no absolute conclusion and might even be an inherent result of using questionnaire reports as the only data. The quality of teacher-student relationships therefore remains open to different interpretations, which is a general limitation of our data. Answers to the first research question, how do various aspects of student well-being and achievement, as well as teacher attitudes, vary across different educational programs vary across educational tracks. Lower results in technical and vocational educational programs can be attributed to differences in student composition. Previous research in the

Slovenian educational system (Cankar & Zupanc, 2020) demonstrated that when students progress to upper secondary education, the most demanding educational track (general gymnasium) tends to attract a more homogenous population with more students with higher social-economic status and fewer students with disabilities, learning difficulties or disadvantages. Consequently, other educational programs receive a more diverse student population leading to more demanding teacher student relations and lower scores on the questionnaire. This is supported by other indices with teachers reporting more classroom management, more stress from student behavior and worse perceived disciplinary climate in vocational and technical educational programs. This is consistent with students' self-reported data on well-being – all indices show the same pattern of differences between educational programs.

The first results of the analysis of PISA data on students' self-reported well-being in Slovenia show that, compared to their peers in OECD countries, Slovenian students reported somewhat lower levels of different aspects of their well-being. This is especially evident in their perceived quality of student-teacher relationships, feelings of belonging to the school, and feelings of safety at school. Notably, this trend is particularly pronounced in technical education and vocational education programs. Moreover, the results from TALIS also confirm that the relationships between students and teachers, as reported by teachers, are at least slightly better in schools offering more advanced programs. These findings align with the fact that these schools enroll higher-achieving students who are better motivated to learn and wish to continue further education at universities. Additionally, the indices measuring the amount of teacher effort to maintain discipline and engage students to manage a positive class climate increase from the most academically demanding program to the least demanding one. Again, one of the reasons could be that students in gymnasia are more motivated for school work than in vocational programs. Additional reasons for increased reports of teachers' efforts to maintain an orderly class climate in vocational schools can be also a consequence of the nature of vocational programs, which include many practical subjects where students are asked to actively work with materials and devices or in teams during lessons, challenges for a quiet and orderly climate. In general, according to teachers' reports, the relations and climate are better in gymnasia than in technical and vocational education. In the view of students, the relations are also better in gymnasia than in vocational educational programs. We may therefore conclude that there are differences in indices of different aspects of well-being between teachers and students in different educational programs. The finding is supported by results of other studies of student well-being in different tracks, academic and vocational, showing the differences in a variety of factors, such as self-concepts and sense

of purpose (Jónsdóttir & Blöndal, 2022), sense of belonging, teachers' trust in students (Van Houtte & Van Maele, 2012), self-esteem and school belonging (Wu & Becker, 2023), mostly in favor of students in academic tracks, but also the crucial role of teacher support to strengthen students' attitudes of well-being.

The study results also show the answer to the second research question, what are the most significant predictors of student well-being in different educational programs. Although the variance of student achievement in mathematics, reading, and science that can be explained by different aspects of students' well-being is relatively low, there is one predictor that proved to be significant across all three domains and in all three educational programs, namely the quality of student-teacher relationships, where the most significant effects were observed when explaining student achievement in reading.

The results of the study therefore suggest that teachers play a crucial role in shaping students' academic performance and psychological well-being through their behavior and interactions within the classroom, and are in line with the studies (e.g., Prewett et al., 2019) that highlight that teachers' prosocial classroom behavior and social-emotional support are the strongest predictors of students' perceptions of high-quality relationships with their teachers. This finding is also supported by results from the Hand in Hand interventions program (Kozina et al., 2020) where the results showed that strengthening the social-emotional skills of both teachers and students has positive effects on various aspects of the learning process, and that a learning environment in which the student perceives that the teacher is working with them to achieve better results has a positive effect, especially on low-achieving students. This finding is particularly important in view of the differences in student well-being within different educational programs in Slovenia. Although strengthening social-emotional skills would empower teachers in any educational program, this research clearly showed that teacher-student relations in technical and vocational educational programs are most strenuous and teachers in these programs would benefit most from such support.

We can conclude that a better understanding of the interplay between factors of school climate and academic outcomes is essential for informing evidence-based interventions aimed at promoting student success and well-being in educational settings. By empowering teachers and influencing classroom practices, educators can create supportive learning environments that empower students to overcome challenges, strive for continuous improvement, and achieve academic success, ultimately promoting both their performance and well-being.

Our study has limitations. The samples from both studies were not designed in advance to be directly linked. The sample of students for PISA include only 15-year-old students, most of them in the first grade of their

secondary schools. The sample of teacher for TALIS includes all teachers of all grades in secondary schools and questionnaires collected their reports on teaching all grades, not only the student population represented by the PISA sample. The interpretations of results are therefore based on more general teacher opinions than on teaching only PISA students. In addition, we are aware of specific differences in student characteristics across school programs that could be related with differences in student opinions, such as gender, SES or educational expectations. Although student populations in general secondary schools are mostly not gender biased, programs in some vocational schools do enroll mostly boys or girls. Unfortunately, available samples for our study statistically did not allow us the extensions to search for differences in vocational programs by student gender or detailed study of impact of student SES on student opinions or teachers' reports. With results showing the need for specific attention to the vocational programs, further studies and more detailed data are needed to address these issues.

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