

The development and preliminary validation of a social-emotional skills assessment instrument for lower secondary school students¹

Piret Einpaul²

University of Tartu, Institute of Education

Äli Leijen

University of Tartu, Institute of Education

Aleksandar Baucal

University of Belgrade, Faculty of Philosophy

Given the necessity of existence of comprehensive and psychometrically sound instruments that measure students' social-emotional skills (SEMS) in school context and facet-level, this study aims to develop and evaluate a SEMS assessment instrument for lower secondary school students. The initial version of the instrument was developed based on the descriptions of skills from the SEMS frameworks by Primi et al. and OECD and consisted of 48 items. After confirmatory factor analysis (CFA) with a sample of 204 students from Estonia, a 9-factor and 34-item instrument has been refined. This model has been confirmed with acceptable fitness by CFA with another sample of 521 students. Strict measurement invariance has been established between grade groups (grades 6 and 9). In conclusion, while analyses show promise and the instrument allows assessing students' SEMS in lower-secondary schools, further research is required.

Key words: social-emotional skills, student evaluation, instrument development, confirmatory factor analysis, measurement invariance

1 We would like to thank all schools, teachers and students who have given their time to participate in our study. This study has been supported by the DIGIVARA5 project "The effect of using digital learning materials for learning and teaching in the context of Estonian basic school (1.05.2020 – 30.04.2023)" financed by the Ministry of Education and Research in Estonia.

2 Corresponding author: piret.einpaul@ut.ee

Social-emotional skills (SEMS) have received increasing attention in educational research due to their contribution to students' mental and physical well-being, academic success and employability (e.g. Chernyshenko et al., 2018; Moffitt et al., 2011; The Organisation for Economic Co-operation and Development, 2021). In order to achieve positive outcomes in school, in life and at work, students need both cognitive and social-emotional skills (OECD, 2015). The development of SEMS as an explicit outgrowth in education has become a new important focus, next to supporting students' mastery in sciences, languages, math and arts (Abrahams et al., 2019). Scholars and policy makers have argued for paying more attention to students' SEMS in recent years. The need for SEMS such as self-management, collaboration, emotion regulation and stress resistance, among others, has been highlighted (De Fruyt, 2019) in order to cope with the challenges of today's volatile, uncertain, complex, and ambiguous world (Primi et al., 2021) and to be able to apply their knowledge in unknown and evolving circumstances (OECD, 2018).

Social-emotional skills have been commonly defined as individual characteristics that "(a) originate in the reciprocal interaction between biological predispositions and environmental factors; (b) are manifested in consistent patterns of thoughts, feelings, and behaviours; (c) continue to develop through formal and informal learning experiences; and (d) influence well-being as well as important socioeconomic outcomes throughout the individual's life" (De Fruyt et al., 2015, OECD, 2015). This definition states that SEMS can be developed through social relationships in formal education. Consequently, there is a need to define the key skills and design the instruments for the assessment and monitoring of the development of students' SEMS.

However, despite the importance of SEMS, the assessment of these skills is still associated with several conceptual and methodological challenges, e.g. no consensus on the nature and number of the constructs necessary to cover the social-emotional competencies (Abrahams et al., 2019; Kyllonen et al., 2014; Primi et al., 2016).

Over the past decades, several authors have proposed more than a hundred SEMS taxonomies and frameworks (Berg et al., 2017), which differ by the number and nature of the domains and facets included. Detailed overviews and comparisons of the prominent comprehensive frameworks can be found in Soto et al. (2021), Abrahams et al. (2019), Chernyshenko et al. (2018) and Primi et al. (2021). Having many different SEMS frameworks in use interferes with the educators' needs to enhance understanding and measuring of students' SEMS. There have been several initiatives towards a unified framework of SEMS in order to overcome this lack of consensus on key social and emotional skills and to support the development of reliable assessment instruments of students' SEMS and comprehensive inclusion of the SEMS development in the school curriculum (Abrahams et al., 2019; Kyllonen et al., 2014; Walton et al. 2021). In recent years, growing consensus has emerged,

as multiple researchers (e.g., Kyllonen et al., 2014; Primi et al., 2016; Soto et al., 2021; Walton, et al. 2021) have argued that the empirically supported and cross-culturally validated taxonomy of the Big Five can be used to make conceptual sense of the hundreds of the SEMS models frameworks, as well as for building an integrative model, as SEMS can be organized within the domains of the Big Five in terms of their behavioural referents (Abrahams et al., 2019; OECD, 2015).

Aiming to develop a comprehensive set of skills that covers the social-emotional functioning of children and youth, based on the reviews of different SEMS frameworks, and empirical analyses of several SEMS inventories, Primi, John, Santos, and De Fruyt (2017, as cited in Abrahams et al., 2019) proposed an integrative model of SEMS. The model distinguishes among five broad social-emotional skill domains, which are conceptually related to the well-researched Big Five model: *Self-management* (related to Conscientiousness), *Engaging with Others* (related to Extraversion), *Amity* (related to Agreeableness), *Negative-Emotion Regulation* (associated with Neuroticism) and *Open-mindedness* (associated with Openness to experience) (Abrahams et al., 2019). In line with that, the conceptual framework for the OECD's Survey on Social and Emotional Skills (SSES), a large-scale, international study of SEMS of 10- and 15-year-old students also drew on the Big Five model and distinguished five dimensions of SEMS: task performance, emotional regulation, open-mindedness, collaboration, and engaging with others (Kankaraš & Suarez-Alvarez, 2019). Each of these five broad domains was divided into subdomains, which were more descriptive and specific, and thus easier to assess. In addition to more specific social and emotional skills, the SSES framework includes compound skills, making it possible to assess a total of 15 skills (Chernyshenko et al, 2018).

As SEMS are seen as the skills that can be developed and stimulated in formal education, schools and teachers play an important role with this respect. In educational systems, the learning objectives related to students' SEMS in curricula usually refer to broad descriptions that might merge several skills into multidimensional or "hybrid" constructs, such as "global citizenship", "entrepreneurship", or "leadership" (Abrahams et al., 2019). In the Estonian *National Curriculum for Basic Schools* (2011), general competences that schools are expected to monitor and develop, include, for example, "social competence", "self-management competence" and "entrepreneurship competence" – broad constructs consisting of multiple skills, whose alignment with comprehensive knowledge of conceptualization and measurement demands further analyses. Using comprehensive frameworks as a basis could help to make reliable and evidence-based decisions on defining, monitoring and supporting of the development of social-emotional skills in educational settings (Abrahams et al., 2019).

Furthermore, there is a strong empirical support for choosing the facet-level approach in modelling the social-emotional skills, as it offers multiple potential advantages over the domain approach, including not only theory development, but also the development of effective and more precise interventions for the educational context (Guo et al., 2023; Primi et al., 2021). In line with that, Napolitano et al. (2021) have also highlighted the need for targeted and timely interventions and have strongly argued for the importance of investigating the social, emotional and behavioural skill development during adolescence as a focal period for future research.

In summary, as stated above, SEMs are important for academic and life success, while schools are considered to be crucial settings for the development of those skills. In order to empower teachers to effectively include SEMs in their school curriculum, as well as to systematically support and monitor the development of students' SEMs at schools, to start with, the valid assessment tools are needed (Abrahams et al., 2019). However, on the assessment side, many of the instruments available for children and adolescents have been developed for specific aims and concerns (e.g. conduct problems), and thus do not enable a comprehensive assessment of the social and emotional attributes relevant in the educational context and for long-term outcomes in life (Primi et al., 2016).

Therefore, in order to better understand and systematically enhance the development of students' SEMs, educators need valid tools that enable them to assess and monitor students' SEMs. Considering that an appropriate assessment tool needs to be relevant to the context in which it is applied, there is a need for the instruments enabling the assessment of SEMs in the school context and on the facet level, rather than assessing SEMs in general, in an unspecified context and on the broad domains level. As both of these previously mentioned representative frameworks – Primi's et al. and OECD's SSES – focus on specific skills of school-aged children and youth (Abrahams et al., 2019, Chernyshenko et al., 2018) on the facet level rather than the broad skill domains, it offers potential for deeper understanding of social and emotional skill development. In addition, it can provide insights for educational settings on developing and monitoring those skills in schools and classrooms. Given the reasons mentioned above, we have chosen these two frameworks as a basis of our SEMs assessment instrument development.

The current study aims to develop and evaluate the SEMs assessment instrument for lower secondary school students. Self-reported inventories, in which each item represents a specific social-emotional skill, are recognized as one possible way to assess SEMs. Based on the two prominent frameworks on students' SEMs – Primi et al.'s (2017) and OECD's SSES framework – a

self-reported instrument is developed to assess nine selected social-emotional skills: self-control, responsibility, persistence, emotional control, stress resistance, empathy, cooperation, trust, and assertiveness. This set of nine skills has been selected according to the results of previous research and the *Estonian National Curriculum for Basic Schools*. Considering relatedness with students' academic performance (Chernyshenko et al., 2018), we include self-control, persistence, responsibility, emotional control and stress resistance. Since being able to co-operate, having empathy and trusting others are underlying markers of collaboration, considered to be highly relevant skills for students (Kankaraš & Suarez-Alvarez, 2019) and stressed as an important part of social competencies expected to be developed in schools stated in the *Estonian National Curriculum for Basic Schools*, we have also included those skills. In developing the first version of the instrument, we have decided not to include the skills from the domain of Open-mindedness (Openness), as the results for the associations between openness and academic achievement from most studies so far have not been clear (Gatzka, 2021), and there is still a need for deeper understanding of the exact underlying mechanisms. After comparing the descriptions of skills from the two selected frameworks, we have decided to include descriptions from both, as we have noticed some differences in the content as possibly helpful in connecting the items of our instrument with a variety of aspects of learning and classroom context. The nine social-emotional skills and their descriptions are presented in Table 1.

Table 1
Social-emotional skills included in the current study

Domain	Skills		Descriptions/definitions		Sample items from the instrument developed (translated for publication)
	OECD	Primi et al.	OECD	Primi et al.	
Task Performance/ Self-management	self-control	focus	Able to avoid distractions and focus attention on the current task in order to achieve personal goals.	Focusing attention on the current task, and avoiding distractions.	<i>I think before I start doing something.</i>
	responsibility	responsibility	Able to honour commitments, and be punctual and reliable.	Possessing time-management skills, being punctual, honouring commitments.	<i>I make sure (for myself) that my school assignments have been submitted on time.</i>
	persistence	persistence	Persevering in tasks and activities until they get done.	Overcoming obstacles to reach important goals.	<i>I can continue with the task I have started even when some obstacles arise.</i>

Domain	Skills		Descriptions/definitions		Sample items from the instrument developed (translated for publication)
	OECD	Primi et al.	OECD	Primi et al.	
Emotional Regulation	stress resistance	stress modulation	Effectiveness in modulating anxiety and being able to calmly solve problems (is relaxed, handles stress well).	Modulating anxiety and response to stress.	<i>I can handle stress well.</i>
	emotional control	frustration tolerance	Effective strategies for regulating temper, anger and irritation in the face of frustrations.	Regulating temper, anger and irritation, maintaining tranquillity and equanimity in the face of frustration.	<i>I can remain calm even in tense situations.</i>
Collaboration/Amity	empathy	compassion	Kindness and caring for others and their well-being that leads to valuing and investing in close relationships.	Using empathy and perspective taking skills to understand the needs and feelings of others, acting on this understanding with kindness and consideration of others.	<i>When my classmate is upset, I offer him/her support.</i>
	trust	trust	Assuming that others generally have good intentions and forgiving those who have done wrong.	Assuming that others generally have good intentions and forgiving those who have done wrong.	<i>I trust my classmates.</i>
	cooperation	respect	Living in harmony with others and valuing interconnectedness among all people.	Treating others with respect and politeness.	<i>I help my classmates when they need help.</i>
Engaging with others	assertiveness	assertiveness	Able to confidently voice opinions, needs, and feelings, and exert social influence.	Speaking up, voicing opinions, need, and feelings, and exerting social influence.	<i>I boldly voice my opinions while communicating with my classmates.</i>

Note. OECD's SSES framework was derived from Chernyshenko et al. (2018) and Kankaraš & Suarez-Alvarez (2019). Primi's et al. (2017) framework was derived from Abrahams et al. (2019).

Our aim in this study is to develop an instrument for assessing lower secondary school students' SEMS in school context and on facet level, as well as to evaluate the psychometric properties of the instrument, focusing on its internal validation. To approach this aim, we formulated the following three research questions:

1. Which factors can be empirically specified in characterizing students' SEMS according to the frameworks and skills chosen for the developed SEMS instrument?
2. Does the instrument enable invariant measurement of SEMS in two grades (the 6th and 9th grade)?
3. Are there any differences between the self-reported levels of SEMS of the 6th and 9th grade students?

Method

Sample and procedure

In this article, we use data the collected from 6th and 9th grade students from January to April 2022 as a part of a larger research project, namely Digiefekt. Participants were from 12 schools in different regions of Estonia. The schools were purposively selected for the Digiefekt project, considering specific variables for forming the sample (e.g., the results in academic tests and the level of digital competence of students), so that the selected schools represented different levels of those variables.

Initially, 542 students filled out the scale online. The data file was then cleaned based on two criteria: (1) whether the grade was the 6th or 9th; (2) whether the respondent selected the same answer for every item in the instrument. After clearing out the unqualified cases, 521 valid participants were retained. The final sample thus encompassed 272 sixth-grade and 249 ninth-grade students, out of whom 240 were males and 281 females. In regard to the number of classes, there were 19 classes of sixth-graders and 17 classes of ninth-graders. The typical age of Estonian sixth-grade students is either 12 or 13 years, and of ninth-graders either 15 or 16 years. Informed consent was obtained from students and their parents. Ethics committee approval was obtained for the study.

The questionnaire was completed in the Estonian language. Data were collected electronically, using the LimeSurvey software. The link to the questionnaire was sent to the teachers of the participating schools. Participants responded to the questionnaire voluntarily. They were allowed to take the survey at school or at home and there was no time limit. Most students completed the scale in about 12 to 20 minutes.

Instrument

A self-report instrument was developed to assess students' social and emotional skills in nine selected dimensions: self-control, responsibility, persistence, emotional control, stress resistance, empathy, cooperation,

trust, and assertiveness. The instrument was based on two comprehensive frameworks of social-emotional skills – Primi's et al. framework (2017, as cited in Abrahams et al., 2019) and OECD's SSES framework (Chernyshenko et al., 2018 and OECD, 2021). The development of the SEMS instrument consisted of two phases: 1) the selection of frameworks and skills and development of items, and 2) the pilot study.

In the first phase, an expert group of three researchers from the social-emotional skills workgroup of the Digiefekt project decided on the SEMS frameworks and specific skills to include. The initial set of items was created by the same expert group. Each expert independently developed a list of items to assess social-emotional skills (at least 3-4 items per each skill), based on the frameworks' key aspects and skills descriptions and considering situations from the school context (e.g., collaboration with classmates, setting goals for learning, coping with distractions while learning). After each expert had finished the item development separately, they compared and discussed the content and wordings of the items together to resolve disagreements; after that, they finalized 48 items for the initial instrument, consisting of self-control (4 items), persistence (5 items), responsibility (7 items), emotional control (7 items), stress resistance (4 items), empathy (8 items), cooperation (4 items), trust (3 items), and assertiveness (6 items). The differences in the initial number of items were related to the lengths of skills descriptions of the frameworks selected, as more detailed descriptions allowed to generate more items. The items had a five-point Likert type agree/disagree response scale, with answers ranging from 1 (*completely disagree*) to 5 (*completely agree*). The option *don't know/can't answer* was also offered.

As a part of this phase, the initial set of items was tested with four teachers and five students (two sixth-grade and three ninth-grade students) to ensure that all items were understandable. Teachers and students were asked to evaluate clarity of the items. As none of the items were reported as "difficult to understand" or "meaning not clear", no changes were made. Most students completed the scale in less than 10 minutes.

In the second phase, the initial version of the developed students' SEMS instrument was used in the pilot study (N=204), whose purpose was to test: (1) the factor structure and psychometric properties of the items of the initial version of instrument developed, and (2) the procedure of the survey in preparation for the main study. Data were collected electronically from 204 students in Estonian schools – sixth-grade students (77) and ninth-grade students (127). Data collection took place in two phases – from May to June 2021 and in September 2021. From the results of the pilot study, we used the correlations between items and CFA results to revise the questionnaire for the main study. Modification indices and standardized residuals were used to locate the items that caused misfits, and, after that, the content of these

items was reviewed. The decisions to include or exclude items during the revision of the questionnaire were made on both the empirical and theoretical grounds. The revised version of the SEMS instrument, used in the current study, consisted of 34 items and 9 factors, mostly four items per factor.

Data analysis

The theoretical model of social-emotional skills was tested using confirmatory factor analysis (CFA), verifying whether it was possible to support the structure of the nine factors defined for the instrument. Analyses were conducted using the statistical programme Mplus version 8.8 (Muthén & Muthén, 2022). First, the goodness of fit of models was evaluated by using a chi-square statistic (χ^2), the Tucker-Lewis index (TLI), the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). According to Hair et al. (2006), the model is acceptable when $RMSEA < 0.05$, CFI and $TLI > 0.9$. We also used the normed chi-square index with an acceptable value below 3 and a good value below 2 (Ullman, 2006).

Second, multiple-group confirmatory factor analyses were conducted in the samples of grades 6 and 9, testing invariance of the measurement model parameters across those two groups. We tested for configural, metric and scalar invariance. All models were estimated in the statistical software package Mplus version 8.8. Student answers are treated as categorical data. With respect to this, the Weighted Least Squares Means and Variance adjusted (WLSMV) were used as estimators. The resulting invariance models were compared with respect to their chi-square statistics, CFI and RMSEA, following the recommendations by Chen (2007), who suggested a criterion of a 0.01 change in CFI to be sufficient to show invariance, paired with the changes in RMSEA of up to 0.015.

All descriptive analyses and *t*-tests were performed in SPSS.

Results

Confirmatory factor analysis

The first research question focused on testing whether nine social-emotional skills assessed via the developed and revised SEMS instrument could be empirically differentiated as latent variables. Confirmatory factor analyses (CFA) were used to test the factor structure of the instrument. The nested structure of the data (individual students nested within classes) was taken into account by using multi-group cluster analyses. CFA with all 34 items – the correlated factor model – showed acceptable fit indices ($\chi^2/df = 2.01$, $RMSEA = .044$, $CFI = .937$, $TLI = .928$).

As some of the latent factors from the same higher-order domains were highly correlated with each other – for example, responsibility and persistence (0.924), stress resistance with emotional control (0.986) and self-control and persistence (0.860) – we also tried to combine the high-correlated factors, but the results of CFA became worse, leading us to choose the nine-factor model.

Since it was possible to organize the nine facet-level social-emotional skills chosen for the instrument into the broad domains according to the theoretical frameworks, we then tested the second-order model (task management, emotional regulation, cooperation, engaging with others) and the general dimensions (the four-factor) model and, finally, the assumption that all factors loaded into one general-factor (unidimensional factor) model, but all them were a worse fit. The fit indices of different CFA models are presented in Table 2.

Table 2

Goodness-of-fit information for Confirmatory Factor Analyses of the SEMS instrument

Factor model	χ^2	<i>df</i>	χ^2/df	RMSEA	CFI	TLI
Nine-factor model	989.4	491	2.02	.044	.937	.928
Second-order model	1073.5	513	2.09	.046	.929	.922
Four-factor model	1128.9	521	2.17	.047	.923	.917
Unidimensional model	1700.6	527	3.22	.065	.851	.842

The results indicate that the correlated factor model with nine SEMS factors was the one with the best fit (see fit indices in Figure 1).

Composite reliability for seven of the nine factors was over the recommended threshold of 0.70, ensuring adequate internal consistency. For two factors – *Trust* and *Assertiveness* – the composite reliability was 0.6. These two scales both consisted of three items and needed further development.

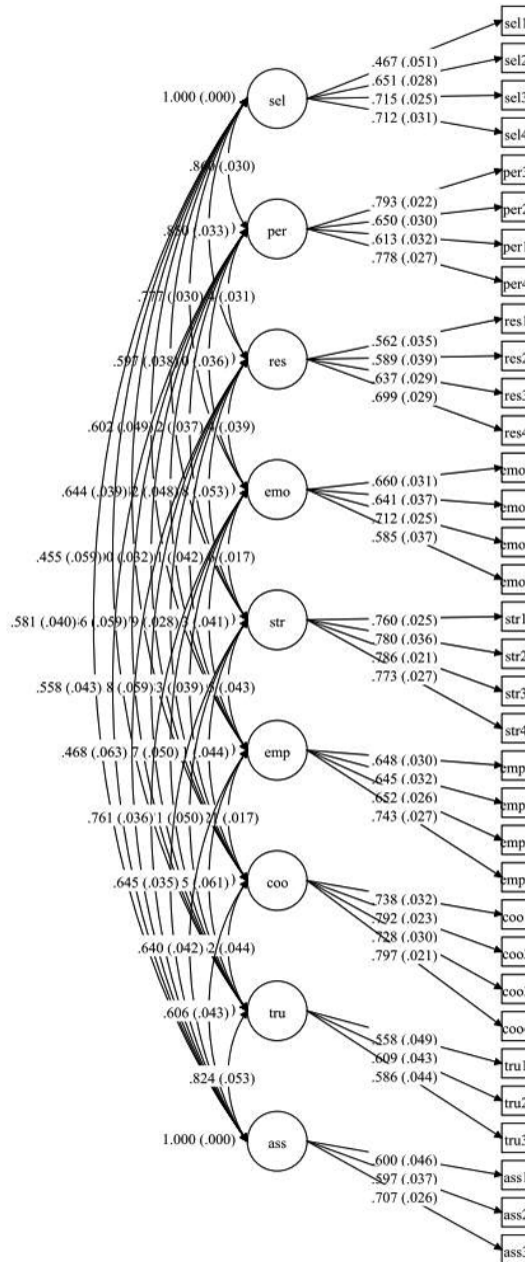


Figure 1. The correlated factor model of students' social-emotional skills ($\chi^2/df = 2.01$, RMSEA = .044, CFI = .937, TLI = .928), WRMR = 1.449; sel = self-control, per = persistence, res = responsibility, emo = emotional control, str = stress resistance, emp = empathy, coo = cooperation, tru = trust, ass = assertiveness.

Measurement invariance

The second analysis investigated whether we could assume measurement invariance of the SEMS instrument for students of different grades, verifying whether the instrument measured the same factors in the same way across grades 6 and 9.

Three levels of invariance were examined. First, we tested for configural invariance, estimating all model parameters freely for grade 6 and grade 9 students. This model resulted in a reasonable fit – χ^2 [982] = 1437.46, CFI = 0.944, TLI = 0.937, RMSEA = 0.042. Given the reasonable fit of this model to the data, in the second step we further examined metric invariance across grades. The resultant model showed a reasonable model fit – χ^2 [1007] = 1442.80, CFI = 0.944, TLI = 0.937, RMSEA = 0.041. Third, we tested for scalar invariance and this model resulted in acceptable fit – χ^2 [1100] = 1516.04, CFI = 0.946, TLI = 0.945, RMSEA = 0.038. Considering the differences in goodness-of-fit statistics between invariance models (Table 3), we accepted the scalar invariance model, which showed acceptable fit.

Table 3

Goodness-of-fit statistics and comparisons among multi-group invariance models

Type of invariance	χ^2	<i>df</i>	χ^2/df	CFI	Δ CFI	TLI	RMSEA	Δ RMSEA
Configural	1437.46	982	1.46	0.941	-	0.933	0.042	-
Metric	1442.80	1007	1.43	0.944	-0.003	0.937	0.041	0.001
Scalar	1516.04	1100	1.37	0.946	-0.002	0.945	0.038	0.003

Note: *df* = Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

In summary, these results provide evidence for measurement invariance, suggesting that the instrument is psychometrically equivalent across grades 6 and 9.

Grade group differences

Regarding the comparison of the sixth-grade and ninth-grade students, *t*-tests were conducted to examine the mean differences between grade groups. The scores of social emotional skills were calculated based on the average scores of the corresponding items. The descriptive statistics and *t*-test results are presented in Table 4.

Table 4
Descriptive statistics and t-test of grades

	Grade 6 (n= 272)		Grade 9 (n= 249)		<i>t</i>	<i>df</i>	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>			
Self-control	3.53	.697	3.28	.668	4.155	507	<.001
Persistence	3.89	.672	3.81	.689	1.215	505	.112
Responsibility	4.11	.628	4.06	.626	.980	506	.164
Emotional control	3.73	.791	3.64	.788	1.365	493	.086
Stress resistance	3.57	.813	3.49	.875	1.628	501	.052
Empathy	4.18	.647	4.16	.615	.490	501	.312
Cooperation	4.25	.624	4.27	.626	.100	507	.460
Trust	3.79	.775	3.80	.756	-.241	507	.405
Assertiveness	3.47	.805	3.39	.841	.828	486	.204

Note: Scale scores ranged from 1 to 5.

The results of the independent samples *t*-test showed that there existed a significant difference between the sixth-grade and ninth-grade students ($t = 4.155, p < 0.01$) in the *Self-control* facet, indicating that the students from the younger cohort ($M = 3.53, SD = 0.697$) reported higher self-control levels than the students from the older cohort ($M = 3.28, SD = 0.668$). There were no significant differences between the grade groups regarding the other eight SEMS factors.

Discussion

This article has described the development and preliminary psychometric evaluation of a self-assessment instrument which could be used to measure social-emotional skills of lower secondary school students. Nine SEMS, namely self-control, responsibility, persistence, emotional control, stress resistance, empathy, cooperation, trust, and assertiveness, were selected to develop the instrument and form the items, based on two prominent frameworks proposed by Primi et al. (2017) and OECD (2019). The first version of the instrument was examined by CFA with 204 participants from the pilot study, showing acceptable fit.

However, in order to improve the instrument, some changes in the items were made both on empirical and theoretical grounds; hence, for the main study, a nine-factor and 34-item instrument was compiled. The revised version of the instrument was further examined by CFA with 521 participants, showing acceptable fit. The results of CFA supported the nine-factor structure of the instrument and therefore confirmed construct validity of the proposed model. This instrument utilizes the facet-level assessment approach and allows to provide specific information about different SEMS. Therefore, it could be used by educators for monitoring students’ SEMS, as well as for developing and targeting interventions in schools.

Similarly to some previous studies using the same frameworks of social-emotional skills, the current study has shown some high correlations between students' self-reported skills from the same domains, for example, self-control and persistence, responsibility and persistence, emotional control and stress resistance. These findings are in accordance with the results from the Finnish sample of the OECD Study on Social and Emotional Skills (Guo et al., 2023). These relatively high correlations between some social-emotional skills (e.g. responsibility and persistence, emotional control and stress resistance) in our study can be explained by belonging to the same higher-order domain, as the skills are conceptually and empirically related to one another. Still, there is also a possibility that some correlations might be related to students' perceptions of those skills, and the results might indicate that students could not differentiate between those social-emotional skills. A possible explanation might be that students may not have had enough opportunities to develop clear understanding of the distinct characteristics of the assessed social-emotional skills, resulting in high correlations in their self-ratings of some skills. If this hypothesis were proved right in the following studies, it would mean that students needed to be supported through formal education to develop better understanding of different social-emotional skills by providing more specific and targeted approaches. Therefore, further analyses should be performed to enhance our understanding on this matter and support students' perceptions of those skills.

Moreover, the present study has used multiple group CFA to investigate measurement invariance of the developed SEMS instrument in the sixth-grade and ninth-grade students. The previously established nine-factor structure of the instrument showed acceptable fit in both samples. The results suggest that the instrument measured the same skills across different grades and the scores of the sixth-grade and ninth-grade students were directly comparable. Therefore, the developed instrument can be used for students of both grades and makes it possible to compare the results for both groups of students. This is an important finding, considering that adolescent years are claimed to be the most focal period for supporting and monitoring the development of SEMS (Napolitano et al., 2021) and our instrument makes it possible to measure and compare the SEMS ratings for lower secondary school students.

The results of this study indicate that self-ratings of SEMS are mostly similar in the sixth-grade and ninth-grade students. For one facet – self-control – the students from the younger cohort reported significantly higher levels than the student from the older cohort. This finding is partially consistent with the previous studies by Soto et al. (2011), which indicated that self-control showed decrease during adolescence, and this decrease was much sharper than in the other facets within the same domain.

In light of the statistical results of this study, we can conclude that the developed instrument exhibits a measure of internal validity, which represents an important foundation for further development. This instrument can be further improved, for example, by cross-validation with teacher rating of students-skills. Another possibility for enhancement is to consider adding more SEMS scales to the instrument, e.g., curiosity. Regarding the role of students' social-emotional skills in the achieved educational outcomes, there is recent evidence that curiosity appears to be among the three most beneficial skills, in addition to self-control and persistence (Goa et al., 2023).

Even though the present study has supported the psychometric properties of the developed SEMS instrument, we would like to pinpoint and discuss some potential limitations. First, the current analysis focused on self-reports of students, and this may be deemed a common methodological weakness of many SEMS evaluation studies. Therefore, additional analyses with several informant ratings are needed to examine whether the psychometric properties evaluated based on students' self-reports are replicated by additional measures. Secondly, due to evidence on low composite reliability in two of the scales, Trust and Assertiveness, it is recommended to analyse and revise the items in order to improve the psychometric characteristics of those two factors. Thirdly, as the current study used no other instrument to measure students' social-emotional skills, no analysis on concurrent or convergent validity was conducted. This represents an important limitation, and a strong recommendation for future research.

Despite its limitations, our study proposes an assessment instrument for SEMS with acceptable psychometric properties. From a practical point of view, the current study has offered an initial version of the SEMS instrument for lower secondary schools, which is easy to administer and can be used for the assessment and educational monitoring of students' SEMS. The nine-factor structure of the instrument has been confirmed and the instrument makes it possible to make comparisons across grades 6 and 9.

Future studies should focus on exploring students' understanding and perceptions of different social-emotional skills and their distinctive aspects, as well as on the possibilities of supporting the development of those skills to achieve more nuanced understanding of different facets.

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Razvoj i preliminarna validacija instrumenta za procenu socijalno-emocionalnih veština za učenike viših razreda osnovnog obrazovanja

Piret Einpaul

Univerzitet u Tartuu, Institut za obrazovanje

Äli Leijen

Univerzitet u Tartuu, Institut za obrazovanje

Aleksandar Baucal

Univerzitet u Beogradu, Filozofski fakultet

Imajući u vidu potrebu za sveobuhvatnim i psihometrijski proverenim instrumentima za procenu učeničkih socijalno-emocionalnih veština (SEMS) u školskom kontekstu, cilj ove studije je da razvije i testira instrument za procenu socijalno-emocionalnih veština učenika viših razreda osnovnog obrazovanja. Početna verzija instrumenta razvijena je na osnovu opisa veština iz SEMS okvira (Primi i saradnici) i na osnovu OECD okvira i sastojala se iz 48 stavke. Nakon konfirmatorne faktorske analize (CFA) na uzorku od 204 učenika iz Estonije, unapređen je instrument sa 9 faktora i 34 stavke. CFA analiza ukazala je da predviđeni model ima prihvatljive fit parametre na alternativnom uzorku koji se sastojao od 521 učenika. Utvrđena je striktna invarijantnost merenja između razreda (6. i 9. razred). Može se zaključiti da, iako analize ukazuju na obećavajuće rezultate i instrument omogućava procenu učeničkih SEMS na višim razredima osnovnog obrazovanja, potrebno je sprovesti dodatna istraživanja.

Ključne reči: socio-emocionalne veštine, procena učenika, konstruisanje instrumenta, konfirmatorna faktorska analiza, invarijantnost merenja