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Adaptation of the entrepreneurship competences questionnaire - when entrepreneurship is more than just business

Radka Čopková
Technical University of Košice, Faculty of Economics, Košice, Slovakia
https://orcid.org/0000-0001-6395-0300
Marek Gróf
Technical University of Košice, Faculty of Economics, Košice, Slovakia
https://orcid.org/0000-0001-8542-8521
Jana Zausinová
Technical University of Košice, Faculty of Economics, Košice, Slovakia
https://orcid.org/0000-0002-6784-2531
Marianna Siničáková
Technical University of Košice, Faculty of Economics, Košice, Slovakia
https://orcid.org/0000-0001-7551-4231

Abstract
Background Since 2006, entrepreneurship competence has been considered one of the eight key competences for lifelong learning, which are important for personal development, social inclusion, active citizenship, and employment. In 2015, the EntreComp framework was created. The framework structures partial entrepreneurship competences to support their development in European citizens regardless of the field of education, professional or occupational orientation, as a critical part of increasing competitiveness and innovation potential of a country.
Purpose: The present paper aimed to develop a questionnaire based on the EntreComp framework, which would serve as a self-assessment tool for one's entrepreneurship competences, which could be used to adopt curricular or extra-curricular and non-formal, education to better serve this goal.
Study design/methodology/approach: The validity and reliability of the questionnaire was examined on a sample of university students in different fields of study – technical and natural sciences, humanities, economics, and medicine. The purpose of the sample diversity is the emphasis on the independence of entrepreneurship competence on professional orientation.
Findings/conclusions: The result of the study is a 60-item questionnaire consisting of three factors and fifteen subfactors helping to identify educational needs in the field of entrepreneurship, based on the subjective perception of the individual. In comparison with already existing tools, this questionnaire was developed on the strong basis of EntreComp framework and supports the idea of the broader context of entrepreneurship competence than just the business level, while covering cognitive, personal, and behavioural level of the entrepreneurial potential.
Limitations/future research: In the future, its application in other age or social groups is suggested.

Keywords
entrepreneurship; entrepreneurship competence; lifelong learning; questionnaire

Introduction

Sufficient entrepreneurship competence in population encourages the foundation of small and medium enterprises, which in turn are major contributors to economic output of a country (Janowski, Gonchar & Yakovyshyn, 2023). According to the European Commission (European Commission, 2020), small and medium enterprises created 54.5% of the whole EU gross domestic product and 61% of all European labour positions in 2018. Therefore, enhancement of entrepreneurship competence should be the centre of attention of central and local governments, higher education institutions and other stakeholders to avoid entrepreneurship educational failures as highlighted e.g. by Funken, Gielnik & Foo (2020) and to consider experiential education instead (Bell & Bell, 2020). Ahn and Winters (2022) examined causal effects of formal education on entrepreneurship proving that education increases probability of entrepreneurship.

Proven by the existence of many definitions, there are several ways in which the phenomenon of entrepreneurship is understood. Probably the most basic way people perceive entrepreneurship is its strongly economic (business) meaning - starting a business, moving in the market, creating products, and providing services, recognizing opportunities, creating new value. Komarkova, Gagliardi, Conrads and Collado (2015) state that over time, this phenomenon began to transcend the boundaries of strictly economic perception and entrepreneurship is now recognized on a much broader scale of produced values - social, cultural, or environmental (Komarkova et al., 2015; McCallum, Weicht, McMullan, & Price, 2018). The range of values that are created through entrepreneurship greatly expands the possibilities of applying other knowledge, skills, and attitudes. After being reduced to business-oriented terminology, according to the OECD (Komarkova et al., 2015) entrepreneurship is defined as "a phenomenon associated with entrepreneurial (human) activity, which is then characterized by value generation, creation or expansion, and identification and exploitation of opportunities."

Based on this meaning shift, there was a tendency to perceive entrepreneurship as a competence. As reported by Komarkova et al. (2015), primarily a distinction between entrepreneurial competence and competency was explained. Entrepreneurial competency is associated with behaviour, motivation, and personality traits. Entrepreneurial competence is tied to measurable results of performance. In the end, the European Parliament and Council (2006) defined competence as a combination of skills, knowledge, and attitudes. This clarifies that entrepreneurship competence reflects a performance/outcomes approach, with behaviour, motivation, and personality traits (competency) as its defining elements. Nevertheless, Komarkova et al. (2015) use the term entrepreneurial competence in both meanings - competence and competency.

The European Parliament and Council (2006) identified entrepreneurship as one of the eight key competences for lifelong learning - literacy; languages; science, technology, engineering and mathematics (STEM); digital; personal, social and learning; civic; entrepreneurship; cultural awareness and expression. All mentioned competences are considered necessary for personal development, social inclusion, active citizenship, and employment (Bacigalupo, Kampylis, Punie, & Van den Brande, 2016). Zhang and Huang (2021) identified issues in entrepreneurship resilience implied by current global economic crisis and post-COVID19 consequences.

1. EntreComp

The EntreComp concept was created (McCallum et al., 2018) in 2015. The aim was to systematize the support system for the development of the entrepreneurial competences of the European population. This framework not only defines exactly what we mean by entrepreneurship as a competence for lifelong learning, but also offers EU citizens universal possibilities for applying procedures for its development in the context of formal education, non-formal education, and training in schools as well as job. It describes and explains which partial knowledge, skills, and attitudes need to be developed to learn to spot opportunities in surroundings, seek resources, and act to create values of different origin (Komarkova et al., 2015; McCallum et al., 2018).

The EntreComp framework consists of three main areas. Each of them is characterized by five competences (Bacigalupo et al., 2016), covering personal, cognitive, and behavioural levels of entrepreneurship competence:

Ideas and Opportunities: Spotting opportunities (using imagination and abilities to identify opportunities for creating value); Creativity (developing creative and purposeful ideas); Vision

(working towards the vision of the future); Valuing ideas (making the most of ideas and opportunities); Ethical and sustainable thinking (assessing the consequences and impact of ideas, opportunities and actions)

Resources: Self-awareness and self-efficacy (believing in oneself and keeping up development); Motivation and perseverance (staying focused and not giving up); Mobilizing resources (gathering and managing the resources one needs); Financial and economic literacy (developing financial and economic know-how); Mobilizing others (inspiring, enthusing and getting others on the board)

Into Action: Taking the initiative (going for it); Planning and management (prioritizing, organizing, and following-up); Coping with uncertainty, ambiguity, and risk (making decisions dealing with uncertainty, ambiguity, and risk); Working with others (teaming up, collaborating and networking); Learning through experience (learning by doing).

Each of these fifteen competences is saturated with two or six additional subcompetences, which makes a total of 60 subcompetences. They are referred to as threads. Each of the 60 threads is defined by eight learning objectives (discover / explore / experiment / dare / improve / reinforce / expand / transform) at four levels of difficulty (foundation / intermediate / advanced / expert). There are 0 to 2 objectives at every level of difficulty. The meaning of this so-called progression model is to point out the effort to reduce external support for the learner and gain autonomy. The whole EntreComp framework thus defines the 442 educational goals needed for the development of entrepreneurial competence (Bacigalupo et al., 2016; McCallum et al., 2018).

These competences do not work in isolation but are interconnected and equally important, with no single key competence. It is not required or expected to have all the competences equally and fully developed, as each entrepreneurship activity and each individual is unique (McCallum et al., 2018).

Since one of the purposes of EntreComp is its implementation into the education and training process, the question of how entrepreneurship competence can be captured has arisen (Bacigalupo et al., 2016). Komarkova et al. (2015) present several tools, as an attempt to capture entrepreneurship competence as a whole. The presented methodologies were focused more on the practical demonstration of knowledge, skills, and attitudes in the form of presentations, projects, discussions, exams. The authors point out the questionable validity. In addition to this practical test, the Enterprise Skills Pass also includes a self-assessment tool aimed at assessing one's progress. Also, one of the components of the Global Entrepreneurship Monitor (GEM) is self-assessment in the area of perception of one's business predispositions (Pilková, Holienka, Rehák, Kovačičová, Komorník, Mitková, et al., 2017). The research was also carried out on Slovak university students who perceived their abilities, skills, and experience for business as sufficient, but the tool focused on entrepreneurship in the economic meaning, in terms of business activity that results in profit, not in terms of entrepreneurship competence. Another approach was brought by the study of Muñiz, Suárez-Álvarez, Pedrosa, Fonseca-Pedrero, and GarcíaCueto (2014), who developed the Battery for the Assessment of the Enterprising Personality (BEPE) for the young population. The tool focuses on specific personality traits, defining so-called entrepreneurial personality by traits such as self-efficacy, risk-taking, innovativeness, achievement motivation, autonomy, internal locus of control, optimism, and stress tolerance. The psychometric properties of BEPE-A (Adaptive) were already examined by Ortuño-Sierra, Gargallo Ibort, Ciarreta López, & Dalmau Torres (2021), who also claim that new instruments are still needed.

Therefore, the present study aims to construct and examine the reliability and validity of a questionnaire exploring the perception of one's entrepreneurship competence. In contrast to previous studies that dealt with skill or ability demonstrations, business context, and entrepreneurial personality, our research focuses on cognitive, personal, and behavioural levels of entrepreneurial potential that are not covered by other available questionnaires.

2. Present study

If entrepreneurship competence is a factor that predisposes an individual to create various values, a tool capturing individual's beliefs about their knowledge, skills, and attitudes seems to be beneficial.

Our starting point for creating such a tool was the EntreComp framework, which defines entrepreneurship as competence and at the same time defines 442 learning objectives at eight levels of difficulty (example of the objective: "I can explain what makes an opportunity to create

value.") (McCallum et al., 2018). As shown, many of these educational goals take the form of "I" statements. The statement form is the reason why we found them suitable for a self-assessment questionnaire. However, as the number of items was too high, a reduction was necessary. At first, the key how to extract the items that would be most suitable for the questionnaire had to be defined. In the context of the progression model, participants are supposed to dispose of certain starting level of entrepreneurial competence while attending educational activities supporting its development. This is the reason to start at the basic skill level – Foundation – and its first sub-levels – discover or explore. The Foundation level is characterized by dependence on external support (Bacigalupo et al., 2016). At the sub-level of discovery, it is the ability to discover potential, mainly through the supervision of teachers, mentors, coaches, etc. (McCallum et al., 2018). Strauti, Dumitrache, and Taucean (2018) state that the minimum level of entrepreneurship competences of university students studying engineering should be at least at intermediate level (building independence), ideally advanced (taking responsibility). However, this questionnaire aims to be a universal tool suitable also for less "entrepreneurial" fields. Items were formulated at the most basic level (foundation), because entrepreneurship competence is connected to the creation of values outside of the economic context as well. In order to prevent inciting too self-confident responses which result from trying to maintain a positive self-image (Jones & Berglas, 1978) avoiding "I" statements during item formulation came into the question. Based on the negative feedback of the small test sample the original "I" statement wording of the educational objectives was left. Likert scale of five points (1 = strongly disagree; 5 = strongly agree) was added to each goal. The resulting questionnaire disposed of 60 items, covering all 3 areas of entrepreneurship competences, but also 15 subcompetences and their 60 threads. Evaluation and results interpretation of the questionnaire is thus possible at different levels as needed and emphasized in the original framework (Bacigalupo et al., 2016; McCallum et al., 2018).

We emphasize that the questionnaire is self-assessed - it shows how respondents see themselves, not what their objective abilities are like.

2.1. Study I – Reliability analysis

2.1.1. Methods

2.1.1.1 Participants

The research sample consisted of 653 Slovak university students (Mage = 22.08; SD = 2.19), 37.20 % men (N = 243; Mage = 21.95; SD = 1.99) and 62.80 % women (N = 410; Mage = 22.15; SD = 2.30). Respondents attended all levels of study – bachelor's (60.50 %), master's/engineering (27.87 %), doctoral (0.76 %) and combined (10.87 %) in five different study fields – economic (39.51 %), technical (29.86 %), social sciences/humanities (15.62 %), medical (11.18 %) and sciences (3.83 %).

2.1.1.2 Measures

EntreComp questionnaire - consists of 60 statements that saturate 3 factors of entrepreneurship competence:

- **Ideas and Opportunities (IO)** - Spotting opportunities (IOF1); Creativity (IOF2); Vision (IOF3); Valuing ideas (IOF4); Ethical and sustainable thinking (IOF5)
- **Resources (R)** - Self – awareness and self-efficacy (RF1); Motivation and perseverance (RF2); Mobilising resources (RF3); Financial and economic literacy (RF4); Mobilising others (RF5)
- **Into Action (IA)** - Taking the initiative (IAF1); Planning and management (IAF2); Coping with uncertainty, ambiguity, and risk (IAF3); Working with others (IAF4); Learning through experience (IAF5)

The number of items in the subfactors varied from two to six. Respondents rate statements on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree).

2.1.1.3 Procedure

The questionnaire was distributed to respondents in the period February – April 2021. The current situation associated with the COVID-19 pandemic allowed collection only in an electronic way. (Google Docs Form web application). Respondents were informed that the completion of the questionnaire was voluntary and anonymous, and the data would be processed only in this research.

A total of 12 partial collections took place. One part took place during online lectures on the Cisco Webex and Microsoft Teams platforms. The online

environment allowed respondents to leave the session anonymously at any time and not to submit the completed form. By participating and completing a questionnaire, they agreed to participate in the research study. The return rate of the questionnaires was 75.1%. In the second part of the collection, the convenience and purposive sampling methods were used via groups of students on social networks and e-mails. The exact return rate could not be identified, as it is difficult to find out in the online environment out of formal sessions.

To ensure that all respondents are Slovak native speakers, all other nationalities were excluded. There was no missing data in the dataset because all items were marked as required. Multivariate outliers were captured with Mahalanobis distance. The normality of the data distribution was tested using the skewness, kurtosis, and Shapiro-Wilk's test. The internal consistency of the questionnaire was tested using McDonald's omega (ω) and Cronbach's alpha (α). Test-retest reliability was tested on only three subsamples (N = 182) from the original 12 after two weeks due to sample availability, using the intraclass correlation coefficient. The return rate of the questionnaires was 64.5 %. Intercorrelations between factors and subfactors of the questionnaire were tested using Spearman correlation coefficient (ρ). In the confirmatory factor analysis (CFA), diagonally weighted least squares (DWLS) estimation method with robust correction was used, which deals better with data that do not meet the criterion of normal distribution (Mîndrila, 2010). The following model fit indicators were evaluated: chi-square ($\chi 2$), relative chi-square ($\chi 2$ / df) Tucker-Lewis index (TLI), comparative fit index (CFI), and the root mean square error of approximation (RMSEA).

The data were subjected to statistical analysis in IBM SPSS Statistics 21, Jamovi 1.2.9, and Jasp 0.14.1.

The pilot version of the questionnaire was created in English, according to the default document. Reliability and validity examination took place in Slovakia; therefore it was necessary to translate the questionnaire. The translation from the English language into the Slovak language was performed by two independent experts in the field of translating. The back-translation into English was done by a third expert. The final wording of the items was discussed to adjust the linguistic nuances. The essence of the meaning of the item was retained, but at the same time, the wording of the item is natural for the Slovak-speaking respondents.

2.1.2. Results

Analyses were performed in several steps. Firstly, normality testing, outliers testing, and descriptive analysis were performed. Subsequently, the internal consistency, test-retest reliability, intercorrelations, and factor structure of the questionnaire were tested.

Based on testing multivariate outliers using the Mahalanobis distance, 19 cases that did not meet the specified criterion (MD = 37.7; $p < 0.001$) were excluded from the sample. The value of skewness and kurtosis did not exceed the criterion > ±1. But Shapiro-Wilk's test showed that the data are not normally distributed ($p < 0.05$), which influenced the subsequent analyses.

Descriptive analysis of the 3 factors and 15 subfactors of the questionnaire is presented in Table 1. The average scale values show that the respondents answered around the mean value, leaning to the second half of the scale.

Table 1 Descriptive and reliability analysis

	descriptives N = 653				internal consistency N = 653			test-retest N = 108		
	M	**SD**	**Min**	**Max**	**Items (n)**	**α**	**ω**	**ICC**	**LB**	**UB**
IO	3.83	0.50	2.00	5.00	**18**	**0.86**	**0.86**	**0.88**	**0.82**	**0.92**
IOF1	3.60	0.64	1.50	5.00	4	0.60	0.61	0.70	0.56	0.79
IOF2	3.72	0.65	1.60	5.00	5	0.74	0.74	0.80	0.72	0.86
IOF3	4.27	0.67	1.67	5.00	3	0.67	0.68	0.77	0.66	0.84
IOF4	3.58	0.82	1.50	5.00	2	0.39	0.40	0.62	0.45	0.74
IOF5	4.12	0.56	2.25	5.00	4	0.57	0.62	0.77	0.66	0.84
R	3.96	0.50	2.42	5.00	**21**	**0.87**	**0.87**	**0.88**	**0.83**	**0.92**
RF1	4.14	0.60	2.00	5.00	4	0.71	0.71	0.82	0.74	0.88
RF2	3.85	0.69	1.60	5.00	5	0.80	0.80	0.86	0.79	0.90
RF3	4.23	0.58	2.25	5.00	4	0.49	0.50	0.79	0.70	0.86
RF4	3.98	0.74	1.00	5.00	4	0.73	0.76	0.81	0.72	0.87
RF5	3.63	0.78	1.50	5.00	4	0.75	0.74	0.80	0.72	0.86
IA	3.85	0.55	1.57	5.00	**21**	**0.90**	**0.90**	**0.85**	**0.79**	**0.90**
IAF1	3.90	0.71	1.33	5.00	3	0.63	0.64	0.87	0.81	0.91

IAF2	3.64	0.70	1.17	5.00	6	0.81	0.82	0.84	0.76	0.83
IAF3	3.57	0.77	1.00	5.00	3	0.66	0.69	0.59	0.41	0.72
IAF4	4.19	0.61	1.83	5.00	6	0.79	0.79	0.73	0.61	0.82
IAF5	3.84	0.73	1.33	5.00	3	0.73	0.73	0.65	0.50	0.76

Note: *M = mean; SD = standard deviation; MIN = minimum; MAX = maximum; n = number; α = Cronbach´s alpha; ω = McDonald´s omega; ICC = intraclass correlation coefficient; LB = lower bound; UB = upper bound*

Source: the authors

Internal consistency analysis was performed by using two coefficients – McDonald's omega and Cronbach's alpha (Table 1). Criteria for assessment were as follows > 0.90 excellent; 0.89 > 0.80 good; 0.79 > 0.70 acceptable; 0.69 > 0.60 poor; 0.59 > 0.50 insufficient (Field, 2013). However, with a small number of items, Cronbach's alpha values around 0.50 are also acceptable (Field, 2013).

The *Ideas & Opportunities* and *Resources* factors reached very good reliability values, and the *Into Action* factor was excellent. A detailed analysis of subfactors showed that the values of the coefficients range from insufficient to very good. The subfactor of *valuing ideas* was especially problematic because the values of both Cronbach's alpha and McDonald's omega were at an insufficient level. The same problem was detected in the *mobilizing resources* subfactor in the *Resources* factor. The subfactors *spotting opportunities, vision, ethical & sustainable thinking, taking the initiative, and coping with uncertainty, ambiguity & risk* also showed a lower internal consistency. Again, these are scales with a small number of items. Given that overall, the main factors of the questionnaire dispose of a very good to excellent internal consistency, the subscales remained. However, the interpretation of results at the subscale level needs to be approached with caution.

Intraclass correlation coefficient, two-way mixed effects model, and type absolute agreement were used to test test-retest reliability. Criteria for assessment were as follows: < 0.5 poor; < 0.7 moderate; < 0.9 good; > 0.9 excellent (Koo & Li, 2016). The results are shown in Table 1. According to the established criteria for intraclass correlation coefficient values with a confidence interval of 95 %, the analysis reached satisfactory results. At the factor level, the results were consistent over time. There was a lower consistency in the sub-factor *valuing ideas* and *coping with uncertainty, ambiguity & risk*, which consist of a small number of items. Overall, the results of the test-retest reliability were very satisfactory, and the questionnaire seems to be consistent over time.

Next, intercorrelations between the factors were examined. The analysis confirmed significantly strong positive relationships between all three factors: $\rho_{IO-R} = 0.739$ ($p < 0.001$; 95 % CI [0.697; 0.769]); $\rho_{IO-IA} = 0.729$ ($p < 0.001$; 95 % CI [0.690; 0.763]); $\rho_{R-IA} = 0.802$ ($p < 0.001$; 95 % CI [0.773; 0.828]).

The same procedure was used at the level of subfactors (F1 – F5 for each factor). Relationships between all variables were positive and statistically significant at the level $p < 0.001$ (Table 2). The subfactors saturating the factor *Ideas & Opportunities* had weaker to moderate relationships. For the subfactors of the *Resources* factor relationships were slightly weaker. Although the relationships between subfactors of *Into Action* factor were not very strong, it is statistically significant.

Table 2 Intercorrelations of EntreComp questionnaire subfactors

	F1			**F2**			**F3**			**F4**			**F5**		
	IO	**R**	**IA**	**IO**	**R**	**IA**	**IO**	**R**	**IA**	**IO**	**R**	**IA**	**IO**	**R**	**IA**
F1	-	-	-												
F2	.62	.61	.56	-	-	-									
F3	.44	.43	.33	.52	.37	.63	-	-	-						
F4	.46	.31	.40	.53	.34	.50	.46	.34	.43	-	-	-			
F5	.40	.52	.49	.44	.63	.57	.46	.31	.54	.36	.31	.50	-	-	-

Source: the authors

In the confirmatory factor analysis (CFA), diagonal weighted least squares (DWLS) estimation method with robust correction was used, which deals better with data that do not meet the criterion of normal distribution (Mîndrila, 2010).

Two hypothetical models were tested; each of them reflects the structure of the EntreComp theoretical framework (Komarkova et al., 2015). In the first model (Model A), the three main factors of the questionnaire (Ideas & Opportunities, Resources, Into Action) were set as latent variables and the 15 subfactors were set as observed variables (IOF1 - IOF5; RF1 - RF5; IAF1 - IAF5). In the second model (Model B), the latent variables were the same, but the observed variables were set at the item level of the given factor. In both models, the chi-square value was statistically significant ($p < 0.05$), which is not a satisfactory result for this type of analysis, but given the size of the research sample, this result is understandable (Babyak & Green, 2010). All other indicators of the model fit reached satisfactory values (Table 3). When comparing the models, Model A achieved slightly better results. However, for both models, the factor structure of the questionnaire was verified.

Table 3 Confirmatory factor analysis of EntreComp questionnaire – Model fit

model	N	χ^2	df	p	χ^2/df	CFI	TLI	RMSEA	RMSEA 90 % CI	
									LB	UB
Model A	653	138.61	87	<0.001	1.59	0.99	0.99	0.03	0.02	0.04
Model B	653	4115.87	1707	<0.001	2.41	0.97	0.96	0.05	0.05	0.05

Note: *N = number of respondents; χ2 = chi square; df = degrees of freedom; ** p <0.01 (Sig.- 2-tailed); χ2 / df = ratio of chi-square value to degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation, CI = confidence interval; LB = lower bound; UB = upper bound*

Source: the authors

3.1. Study II – Validity

The second part of the study was focused on the relationships of the EntreComp questionnaire and its factors and subfactors with other variables. The convergent and divergent validity of the EntreComp questionnaire was examined in this way.

3.1.1. Methods

3.1.1.1 Participants

The research sample consisted of 169 Slovak university students (M_{age} = 21.97; SD = 2.22), 30.20 % men (N = 51; M_{age} = 22.20; SD = 2.01) and 69.80 % women (N = 118; M_{age} = 21.20; SD = 1.51). Respondents attended all levels of study – bachelor's (75.14 %), master's / engineering (18.34 %), doctoral (0.60 %) and combined (5.92 %) in five different directions – economic (65.10 %), technical (14.79 %), social sciences/humanities (11.24 %), medical (4.14 %) and sciences (4.73 %).

3.1.1.2 Measures

Except of *EntreComp* questionnaire, the following measures were used as validation methods:

- *Grit* (Duckworth & Quinn, 2009; Kropáčová, S., Slezáčková, & Jarden, 2018);
- *General self-efficacy scale* (Košč, Heftyová, Schwarzer, & Jerusalem, 1993);
- *Brief Self-control Scale* (Tangney, Baumeister, & Boone, 2004);
- *Motivation* (Sheldon, & Elliot, 1999);
- *DOSPERT - Domain-Specific Risk-Taking* (Blais & Weber, 2006);
- *TEIQue - Trait Emotional Intelligence Questionnaire* (Kaliská, Nábělková, & Salbot, 2015; Petrides, & Furnham, 2009);
- *NEO FFI – Five-factor personality inventory* (McCrae & Costa, 2004; Ruisel, & Halama, 2007);
- *Short Dark Triad Scale* (Čopková & Šafár, 2021; Jones & Paulhus, 2014).

3.1.1.3 Measures

The procedure was run in the same way as in Study I. The return rate of the questionnaires was 64.5 %.

There were no missing data in the dataset because all items were marked as required in the online form. The normality of the data distribution was tested using the skewness, kurtosis, and Shapiro-Wilk's test. The internal consistency of the questionnaire was tested using McDonald's omega (ω). Convergent and divergent validity was tested using the Spearman correlation coefficient (ρ). The data were subjected to statistical analysis in IBM SPSS Statistics 21, Jamovi 1.2.9.

2.1.2. Results

The value of skewness and kurtosis did not exceed the criterion > ±1, but Shapiro-Wilk's test showed that the data are not normally distributed ($p < 0.05$). Thus, a nonparametric Spearman correlation coefficient was used to verify convergent and divergent validity. Convergent validity was confirmed in the factor *Ideas & Opportunities*, which correlated positively and significantly with extraversion, openness, conscientiousness, narcissism, grit, perseverance of effort, self-efficacy, self-control, autonomous motivation, emotionality, and sociability. Divergent validity proved to be a negatively significant correlation with neuroticism, and psychopathy.

In the *Resources* factor, convergent validity was confirmed by a positive significant relationship with extraversion, conscientiousness, narcissism, perseverance of effort, self-efficacy, self-control, autonomous motivation, emotionality, and sociability. Divergent validity was confirmed by a negative significant relationship with neuroticism.

In the *Into Action* factor, convergent validity was confirmed by a positive significant relationship with extraversion, openness, conscientiousness, grit, consistency of interest, perseverance of effort, self-efficacy, self-control, autonomous motivation, sociability, and emotionality. Divergent validity was confirmed by a negative significant relationship with neuroticism and psychopathy. Specific values of correlation coefficients are presented in the table (Table 4).

Table 4 Convergent and divergent validity of EntreComp questionnaire factors

		IO	R	IA
NEO FFI	*neuroticism*	**-.34*** **	**-.33*** **	**-.27*** **
	extraversion	**.44*** **	**.50*** **	**.40*** **
	openness	**.22****	.14	**.24****
	agreeableness	.13	.03	0.08
	conscientiousness	**.48***	**.61*** **	**.52*** **
Short Dark Triad	*Machiavellianism*	-.00	.04	-.06
	narcissism	**.18***	**.32*** **	.14
	psychopathy	**-.15***	-.05	**-.18***
Short Grit Scale	*total*	**.16***	.19*	**.17***
	consistency of interest	-.14	-.12	**.15***
	perseverance of effort	**.45*** **	**.46*** **	**.46*** **
General self-efficacy scale		**.62*** **	**.65*** **	**.61*** **
Brief Self-control Scale		**.40*** **	**.48*** **	**.39*** **
Motivation	*autonomous*	**.37*** **	**.43*** **	**.42*** **
	non-autonomous	-.06	-.07	-.06
DOSPERT	*ethical*	-.04	-.04	.04
	social	-.04	.02	.04
	financial	-.01	-.01	-.08
TEIQue	*emotionality*	**.32*** **	**.34*** **	**.34*** **
	sociability	**.41*** **	**.46*** **	**.41*** **

Note: *$p < 0.01$ (Sig.- 2-tailed); **$p < 0.01$ (Sig.- 2-tailed); ***$p < 0.01$ (Sig.- 2-tailed)
Source: the authors

Based on the table above, all three main factors of the EntreComp questionnaire have a significant negative relationship with neuroticism and positive significant relationships with extraversion, conscientiousness, perseverance of effort, self-efficacy, self-control, autonomous motivation, sociability, and emotionality. On the contrary, all factors showed very weak and insignificant relationships with agreeableness, Machiavellianism, non-autonomous motivation, and risk-taking (financial, ethical, social).

Discussion

The main goal of the present study was to create a questionnaire that would capture the perception of one's entrepreneurship competence. As entrepreneurial competence was identified by the European Commission as one of the eight key competences for lifelong learning (European Parliament and Council, 2006), the starting point for the questionnaire development was the European EntreComp framework (Komarkova et al., 2015). The result is a questionnaire consisting of 60 items, which saturate 15 subfactors and those saturate the three main factors. This makes it possible to evaluate the questionnaire at two levels and also partially by individual competences.

The EntreComp framework was created to educate the European population in both formal and informal ways. Naturally, there is a noticeable trend to use the framework in academic settings.

This was the reason why a sample of university students was chosen. Ortuño-Sierra et al. (2021) also point out the importance of a school in entrepreneurial abilities development. Students are in the process of preparation for a particular profession, so their knowledge, skills, and attitudes are supposed to be at the so-called starting line, which varies. Compared to younger students, e.g. in primary and secondary school, university students reach a level of formal thinking, so it should not be a problem for them to understand the abstract statements about value creation.

The secondary goal was to examine the reliability and validity of the new questionnaire. Two separate studies were conducted. In both, the sample consisted of university students. Since entrepreneurship competence is not only about creating financial values, but also about social, cultural, or environmental values (Komarkova et al., 2015; McCallum et al., 2018), social sciences, humanities, natural science, medical and technical study fields were included.

The results indicated that the respondents perceived their competences positively. It looks like they believe in themselves. This result is consistent with the findings of Pilková et al. (2017), who also researched the perception of Slovak university students' entrepreneurship competences. The results could be explained by the basic item formulation on the foundation (discover) level, which is characterized by dependence on external support (Bacigalupo et al., 2016; McCallum et al., 2018). Strauti et al. (2018) state that the minimum level of entrepreneurship competences of university students studying engineering should be at least intermediate (building independence), ideally advanced (taking responsibility). However, not only engineering study fields were included in the sample, so base level was retained.

Testing of internal consistency and time stability yielded satisfactory results. However, the internal consistency coefficients of some subfactors were low. These subfactors were made up of a small number of items, which may be the reason for the low values of the coefficients (Field, 2013). Therefore, these values were accepted as sufficient. The same approach was chosen when interpreting the test-retest results. The relationships between the subfactors of the individual factors were significant and positive, which created a good precondition for verification of the factor structure of the questionnaire. Confirmatory factor analysis, but with robust estimators, because the data were not normally distributed (Mîndrila, 2010), was conducted. Two models were tested. Chi-square was statistically significant in both cases, which is not a satisfactory result for this type of analysis, but given the size of the research sample, this result is understandable (Babyak & Green, 2010). Other indicators reached the required values (Arbuckle, 2011). This result is not entirely surprising, because the items in the questionnaire were derived from the defined educational goals in the EntreComp framework (Komarkova et al., 2015).

The next step was to verify the convergent and divergent validity of the questionnaire. The relationship between Big Five personality traits and entrepreneurship intentions, behaviours, success, activities, experiences, attitudes has been addressed by many researchers in recent years (Antoncic, Bratkovic Kregar, Singh, & DeNoble, 2015; Hachana, Berraies, & Ftiti, 2018; Kerr, Kerr, & Xu, 2018; Leutner, Ahmetoglu, Akhtar, & Chamorro-Premuzic, 2014; Mortan, Ripoll, Carvalho, & Bernal, 2014). Although they did not directly relate to entrepreneurship competence, some connections were found. The results of the current study indicate that entrepreneurship competence has a negative relationship with neuroticism and positive relationships with extraversion, conscientiousness, and openness to experience. Similar results are interpreted by Kerr et al. (2018), who prepared a literature review of the personality traits of entrepreneurs. According to this information, entrepreneurship is characterized by emotional stability (the opposite of neuroticism), openness, and extraversion. Openness, together with extraversion, is also defined by Antoncic et al. (2015) as a key personality characteristic of entrepreneurs. On the contrary, conscientiousness and neuroticism emerged from their research as less relevant personality traits. Zhao, Seibert, and Lumpkin (2010) also identified openness as the key personality trait for entrepreneurship, but along with conscientiousness. All studies, including this one, have concluded that agreeableness is not related to entrepreneurship.

Machiavellianism showed no relationship with entrepreneurial competences, which is surprising result because it is characterized by a tendency to manipulate, to achieve one's own goal regardless of the others (Al Aïn, Carré, Fantini-Hauwel, Baudouin, & Besche-Richard, 2013). On the other hand, if Machiavellianism is perceived as the opposite of agreeableness, this result is understandable. However, narcissism as a feature

of a sense of self-importance and superiority over others (Maynard, Brondolo, Connelly, & Sauer, 2015) had positive relationships with entrepreneurial competences. There were also positive relationships with psychopathy, which is characterized by high impulsivity, excitement seeking, low empathy, low degree of anxiety (Paulhus & Williams, 2002), but the relationships were negative. Kramer, Cesinger, Schwarzinger, and Gelléri (2011) achieved the same results in the case of Machiavellianism and narcissism, but in their research, psychopathy also correlated positively with elements of entrepreneurship intention.

Grit, similarly to perseverance and passion in achieving long-term goals (Duckworth & Quinn, 2009), was positively associated with almost all entrepreneurship competences. Perseverance was considered by Arco-Tirado, Bojica, Fernández-Martín, and Hoyle (2019) to be an important prerequisite for starting a business career with students as well. Their assumption was also confirmed, but they note that this relationship is influenced by other subjective as well as objective features. These results are supported, for example, by the study of Butz, Hanson, Schultz, and Warzynski (2018).

Self-efficacy and self-control had positive relationships with all factors of the questionnaire. With self-efficacy, this is not a surprising result, as it is directly part of the Resources factor. The importance of self-efficacy in the field of entrepreneurship is also pointed out, for example, by Zisser, Johnson, Freeman, and Staudenmaier (2019), Newman, Obschonka, Schwarz, Cohen, and Nielsen (2019), and Gielnik, Bledow, and Stark (2020). Gielnik et al. (2020) also interpret it in connection with self-motivation, which also supports results of this study. According to those, autonomous motivation based on internalized principles (Sheldon & Elliot, 1999) had positive relationships with entrepreneurship competences.

Several studies also linked risk-taking to entrepreneurship, especially entrepreneurship intention, (Macko & Tyszka, 2009; Zhao et al., 2010; Zisser et al., 2019), which points to their interconnectedness. However, the relationships with entrepreneurship competences did not show at all. On the contrary, emotionality and sociability as factors of emotional intelligence have shown positive relationships with all entrepreneurship competences. This result is also supported by previous studies, where emotional intelligence has been positively correlated with entrepreneurship intentions (Zampetakis, Kafetsios, Bouranta, Dewett, & Moustakis, 2009), leadership, motivation, resilience (Humphrey, 2013), entrepreneurial success, and behaviours (Ahmetoglu, Leutner, & Chamorro-Premuzic, 2011).

The presented study also has its limitations. Due to the situation caused by the COVID-19 pandemic, data were collected online via Google Docs Form. In the current situation, this allowed us to gather a large amount of information in a relatively short period of time, at the cost of reduced control over the environment and conditions of the data collection process. Often, students left the lecture before completing the questionnaire. While this can be limiting, only data from those respondents who were really motivated to fill in the questionnaire were obtained. This is perhaps the reason why respondents scored relatively high in subfactors of the questionnaire. It is likely that the respondents who were not willing to fill in the questionnaire do not have sufficient features such as self-control, self-efficacy, conscientiousness, which, according to our findings and the findings of other authors are key traits in entrepreneurship. The formulation of statements in the questionnaire could also be problematic - the form of "I" statements. This may encourage respondents to answer in the agreeing half of the scale (strongly agree). The questionnaire was created in the English version because the EntreComp documents are also in English. Therefore, variation may have arisen during its translation, although experts in the field of translation took part in it. Formulation of the statements in the questionnaire at the most basic level is limitation, but also a stimulus for future research. Strauti et al. (2018) consider the intermediate to advanced level to be suitable level for university students when it comes to engineering area. However, students in other fields also dispose of a certain level of entrepreneurship competences higher than our expected foundation level.

Conclusion

The benefit of the present study is the development of a reliable and valid tool for capturing perceived entrepreneurship competence convenient for self-assessment of students or graduates regardless of their specialization. Thanks to it, the structure of partial competences might be captured. Respectively, it is possible to reveal the perceived strengths and weaknesses of the participants and

compile learning activities accordingly. Because it is not a performance test, but a self-assessment questionnaire, rare information about the self-image of an individual in the field of their entrepreneurship competences is obtained. While other existing tools focus on the skill and ability demonstrations, business context, and entrepreneurial personality, the questionnaire developed on the basis of the EntreComp framework offers the coverage of entrepreneurial competence on cognitive, personal, and behavioural levels in different settings. Another advantage is that questionnaire items are based on the already existing theoretical concept and the resulting educational goals.

The application of the questionnaire is seen in the same way as the authors of the EntreComp framework suggest – in the field of formal and informal education. It could be a primary step in identifying the educational needs of specific groups, thus helping to create specific learning programs and activities to increase the competitiveness and innovation potential of the country. The comparison of perceived own entrepreneurship competence and objective entrepreneurial performance would be interesting as well. In the future, creation and adaptation of other language variations of the EntreComp questionnaire for using in different cultures is recommended. In this way, data from different countries of the European Union might be collected and compared, and entrepreneurship intervention programs adapted accordingly. Different age or social groups as a sample are suggested.

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✉ **Correspondence**
Marianna Siničáková

Technical University of Košice, Faculty of Economics
Němcovej 32, 042 00 Košice, Slovakia

E-mail: marianna.sinicakova@tuke.sk