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## Replication Study of the Slovak MESI Scale and its Construct Validity in Two Research Samples

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### Abstract

The replication study offers research findings from verification of the construct validity of social intelligence by the Slovak MESI scale (Manipulation, Empathy, Social Irritability – MESI, Frankovský, Birknerová, 2014) by means of confirmatory factor analysis, and by convergent/discriminant validity by the trait emotional intelligence questionnaire (Petrides, 2009) in two samples (secondary school students:  $N = 134$ ,  $M_{\text{age}} = 17.7$  years old / $SD = 0.47$ /, 66% women; university students:  $N = 138$ ,  $M_{\text{age}} = 21.52$  years old / $SD = 1.81$ /, 77% women). Results of confirmatory factor analysis (CFA) confirm the three-factor solution of the MESI scale (extracted factors of Manipulation, Empathy, Social Irritability) in accordance with the authors' original solution in both samples. Trait emotional intelligence (EI) and its four factors enter into significant positive relationships with Empathy (convergent validity) and negative relationships with Social Irritability (discriminant validity). The global level of trait EI can be predicted by the factor of Empathy and Social Irritability in both research samples. Our findings confirm substantiation of the MESI scale for assessment of social intelligence, and its possible application in targeted educational interventions in a school environment.

**Keywords:** *emotional intelligence, social intelligence, MESI scale, TEIQue-SF questionnaire, replication study, CFA, correlation and regression analyses*

## **Introduction**

Although the history of the construct of intelligence is more than a hundred years old, the interest of several sciences, including pedagogical sciences, in the construct is still unabated (Bello, Yusuf, Amali, 2017; Plociennik, 2017; Przybylska, 2016). The ambiguous explanation of intelligence on the basis of the general g-factor has influenced formation of conceptions focused on the multi-factoriality of the construct, thus increasing the requirement to develop education-related measuring tools acceptable for its assessment. At present, not only cognitive dispositions of an individual/pupil are emphasized, but intelligent behaviour is assessed in the context of effective functioning in a wider social framework. As a result of such challenges, research analyses have been made and cyclically returning, aimed at operationalization of the construct of intelligence and verification of its tools. An assessment of construct validity as the basic characteristic of the construct, by means of both verification of the factor structure of the tool for its measuring and investigation into the complementarity of related intelligence types is the subject also of this study. The article is a continuation of a long-term effort to study relationships between intelligences, i.e., emotional intelligence (hereinafter EI) and social intelligence (hereinafter SI) based on both foreign (Silvera, Martinussen, Dahl, 2001; Schultze, Roberts, 2007; Arghode, 2013; etc.) and Slovak (Frankovský, Birknerová, 2014; etc.<sup>1</sup>) studies.

On the other hand, the study reflects the requirement for replication research to be made also in pedagogical sciences (KNAW, 2018), because it is the ability to reproduce results that facilitates scientific progress in the sense of increasing the credibility of scientific knowledge and validity of the assessment itself. The aim of a replication study is to repeat a previous study using similar methods with the aim to determine the reproducibility of previously obtained results.

## **Construct of social intelligence**

Already in 1920 attention was drawn to SI by Thorndike, who defined it as an ability to understand and manage men and women. Thorndike's definition of SI

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<sup>1</sup> Our research intention was also to verify the comparison and complementarity of SI and EI in Kaliská and Salbot (2018), in the study *Komplementarita črtovej emocionálnej inteligencie a sociálnej inteligencie u vysokoškolákov* (Complementarity of Trait Emotional Intelligence and Social Intelligence in University Students), and in Kaliská and Kaliský (2015), in the study *Sociálna verus emocionálna inteligencia – vzájomná komplementarita* (Social versus Emotional Intelligence – Mutual Complementarity).

had two basic criteria: the ability to understand other people and the ability to act wisely in human relations. It was the basis for further definitions in the context of personal intelligences (Gardner, 1993). As stated by Silvera et al. (2001), some SI dimensions closely relate to academic intelligence, whereas others rather to personality traits (Schneider, Ackerman, Kanfer, 1996) such as extraversion, social influence, or insight, social perceptiveness, social adequacy and social adjustment.

As a result of operationalization of the SI construct, researchers form and verify their tools based on cognitive or behavioural assumptions using a psychometric or personality approach to SI measuring (Kihlstrom, Cantor, 2000). The psychometric approach (e.g., the model by Silvera et al., 2001) analyses SI by a person's performance of social skills. The personality approach (e.g., Ford, Tisak in Kihlstrom, Cantor, 2000) assesses SI on the basis of effective behaviour in interpersonal situations with regard to subjective perception of the situation, its assessment and interpretation. A significant increase has been recorded in methodologies in the context of both approaches, in particular abroad (the best known are *The Tromsø Social Intelligence Scale* by Silvera et al. /2001/, *Sternberg's SI Test (MTSI)* /Conzelmann, Weis, Süs, 2013/, etc.). However, validity (in particular construct validity) and reliability of such tools still have not been sufficiently verified. In the Slovak scientific and research environment, development of SI measuring tools is rarer. The only scale assessing the SI level is the MESI scale (*Manipulation, Empathy, Social Irritability*) by Frankovský and Birknerová (2014), who have verified its properties over a long period. The MESI scale is based on the *PESI* methodology (Kaukiainen, Björkqvist, Osterman, Lagerspetz, Forsblom, 1995, in Frankovský, Birknerová, 2014).

## **Complementarity of SI and SE constructs**

At present, the concepts such as emotional intelligence, practical intelligence, social competence, etc. (Schneider et al., 1996; Schultze, Roberts, 2007) alternate. We state that with its content, SI reflects many aspects of EI itself (empathy, openness to experience). On the other hand, e.g. the trait EI model (Petrides, 2009), accentuating recognition of emotions, self-perception and personality dispositions in the context of personality traits oriented to emotions, directly captures SI aspects in particular in the factor of Sociability (management of others, assertiveness, social awareness; Petrides, 2009). The ambiguity of SI or EI conceptions has been apparent from their beginning, with the first EI model (Mayer, Salovey, 1993), classifying emotions as socially determined behaviours and EI as a subset

of SI. Later, the above authors state that EI is broader than SI because it relates not only to emotions reflected in social situations, but also to inner experiencing of an individual and his/her emotions that determine it (Mayer, Caruso, Salovey, 2000). On the basis of empirical research, Arhode (2013), Kang, Day and Meara (2007, as cited in Schultze, Roberts, 2007) arrive at the conclusion that both constructs are multidimensional, interdependent and overlapping, while it is too early to draw conclusions about the extent of the overlap. On the other hand, other empirical studies (Kang et al., 2007, as cited in Schultze, Roberts, 2007) give evidence of their ambiguous relationship. In our previous studies, we assessed the degree of complementarity between trait EI measured by Petrides' TEIQue-SF questionnaire and SI measured by *The Tromso Social Intelligence Scale* (Silvera et al., 2001). We have revealed mutual overlap of more than 54% in various developmental periods<sup>2</sup>.

Verification of the construct validity of intelligence is a lengthy process, thus we concentrate on replication of the construct validity of the Slovak SI methodology, Frankovský and Birknerová's MESI scale (2014) by factor analysis and in the context of trait EI (convergent/discriminant character of the construct validity) in two different samples.

## **Research problem**

Our research aim was to verify construct validity (by factor analysis and its convergent and discriminant character) of the Slovak scale measuring SI, Frankovský and Birknerová's MESI scale (2014) in the context of trait EI and its four factors in Petrides' trait EI questionnaire *TEIQue-SF* (2009) by means of confirmatory factor analysis (CFA), correlation and regression analyses in two samples, in secondary school students (SS) and university students (US).

## **Research questions**

The following three research questions (RQ) were posed:

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<sup>2</sup> Results are given in Kaliská, L., Salbot, V. (2018) *Komplementarita črtovej emocionálnej inteligencie a sociálnej inteligencie u vysokoškolákov. Agresia vo verejnom priestore* (Complementarity of Trait Emotional Intelligence and Social Intelligence in University Students. Aggression in Public Space). Bratislava: SPS SAV, 200–12; Kaliská, L., Kaliský, J. (2015) *Sociálna verzus emocionálna inteligencia – vzájomná komplementarita* (Social versus Emotional Intelligence – Mutual Complementarity) In *Sapere Aude* 2015. Hradec Králové: Magnanimitas, 365–72.

- Q1: Can the factor structure of Frankovský and Birknerová's MESI scale (2014) be replicated in two different samples in accordance with the factor structure extracted by the authors?
- Q2: Are there any significant relationships between the individual factors and global level of trait EI assessed by the TEIQue-SF (Petrides, 2009) and the SI factors assessed by the MESI scale (Frankovský, Birknerová, 2014) in two samples?
- Q3: Which SI factors in the MESI scale can predict the global level of trait EI in the TEIQue-SF in two samples?

## **Research sample**

We worked with two research samples obtained by convenient sampling. The first research sample consisted of 154 secondary school students from two grammar schools in the Central Slovakia Region. The average age of the respondents was 17.7 years ( $SD = 0.47$ ). The research sample was composed mostly of women (66%). The other research sample consisted of 138 university students from Matej Bel University three faculties (Education, Arts, Natural Sciences). The average age of the respondents was 21.52 years ( $SD = 1.81$ ). This research sample was also not gender-balanced (77% women, 17% men, 6% failing to specify their gender).

## **Research methods**

To assess trait EI, the Slovak version, verified by us, of the TEIQue-SF (*Trait Emotional Intelligence Questionnaire – Short Form*, Petrides, 2009) was used, measuring the global level of trait EI (4 factors for research purposes only) in adolescents from the age of 13. The tool consists of 30 items where respondents respond on a 7-point scale (1 – completely disagree to 7 – completely agree). Administration takes 7 minutes. The assessed reliability in terms of internal consistency (reliability split-half estimation:  $r_{xx} = .87$  for SS and  $r_{xx} = .83$  for US. Cronbach's alpha  $\alpha = .82$  for SS and  $\alpha = .84$  for US) is of highly acceptable values. Our previous research had confirmed sufficient psychometric values of both short and long forms of TEIQue Slovak versions.

To assess the SI level, Frankovský and Birknerová's MESI scale (2014) was used. The scale consists of 21 items assessed on a 5-point scale (0 – never to 4 – very often). Using factor analysis, the authors abstracted the following 3 SI factors:

Factor 1: Manipulation – indicating a person's skills to persuade others to do anything, i.e., the person can use others for their own benefit.

Factor 2: Empathy – reflecting a person's ability to recognize intentions, feelings, wishes and weaknesses of others.

Factor 3: Social irritability – suggesting that persons get nervous in contact with others (Frankovský, Birknerová, 2014)).

## Research results

*Q1: Can the factor structure of Frankovský and Birknerová's MESI scale (2014) be replicated in two different samples in accordance with the factor structure extracted by the authors?*

Data obtained from the MESI scale in two different research samples were subject to confirmatory factor analysis (CFA) with the aim to confirm the original factor structure of the MESI scale (available on <http://www.ccsenet.org/journal/index.php/ass/article/view/34666>). The Kaiser-Meyer-Olkin index (*KMO*) assumed acceptable values (.786 for SS; .765 for US). To confirm the dimensionality of the MESI original Slovak version, principle component analysis (PCA) with a varimax rotation was used. Table 1 presents the original factor loadings by the authors of the scale and the factor loadings for our two samples.

**Table 1.** MESI scale factor loadings

Items	University students			Secondary school students			Original questionnaire		
	F1	F2	F3	F1	F2	F3	F1	F2	F3
1.			.680			.585			.627
2.		.678			.680			.607	
3.		.770			.808			.472	
4.			.555			.542			.614
5.	.673			.640			.626		
6.	.706			.752			.698		
7.			.668			.675			.680
8.		.712			.784			.756	
9.		.568			.474			.618	
10.			.333			.412			.494
11.	.801			.782			.702		

Items	University students			Secondary school students			Original questionnaire		
	F1	F2	F3	F1	F2	F3	F1	F2	F3
12.	.830			.840			.800		
13.	.670			.731			.705		
14.			.745			.823			.755
15.			.598			.669			.640
16.		.785			.759			.713	
17.		.677			.606			.634	
18.			.348			.458			.409
19.	.732			.817			.755		
20.	.638			.567			.647		
21.		.635			.634			.635	
<b>Eigenvalue</b>	4.41	3.46	2.28	5.55	3.41	2.06	4.38	3.54	1.97
<b>Variance %</b>	21.01	16.46	10.86	26.45	16.26	9.80	20.86	16.86	9.36
<b>Cronbach's alpha</b>	.880	.823	.714	.854	.825	.647	.845	.772	.725

F1 – Manipulation, F2 – Empathy, F3 – Social irritability

CFA confirmed the 3-factor structure of the MESI scale in both research samples; with 3 factors explaining 47.1% of the overall variability of variance in the original version, while 48.34% in the university students and up to 52.50% in the secondary school students. Also, the same factor loadings were revealed for 3 generated factors (factors of Manipulation, Empathy, Social Irritability) in two different groups as those generated by the authors of the scale. Cronbach's alpha also assumed acceptable values in all the factors in our research samples.

*Q2: Are there any significant relationships between the individual factors and global level of trait EI assessed by the TEIQue-SF (Petrides, 2009) and the SI factors assessed by the MESI scale (Frankovský, Birknerová, 2014) in two samples?*

The assumption of normal distribution of the variables under study was confirmed and allowed for parametric statistical analysis of the obtained data. Pearson's correlation coefficient was used to assess the direction and strength of relationships between the factors and global level of trait EI from the TEIQue-SF questionnaire and the SI dimensions from the MESI scale. The research findings are presented in Table 2.

**Table 2.** Correlation analysis of the trait EI factors and global level and the MESI dimensions in 2 research samples

		Secondary school students			University students		
		SI (MESI)					
	EI (TEIQue-SF)	Manipulation	Empathy	Social Irritability	Manipulation	Empathy	Social Irritability
Factors	Well-being	.045	.262 ***	-.381 ***	.024	.352 ***	-.303 ***
	Self-control	.099	.224 **	-.269 ***	.015	.265 **	-.360 ***
	Emotionality	-.151	.444 ***	-.444 ***	-.206 *	.276 ***	-.400 ***
	Sociability	.559 ***	.536 ***	-.294 ***	.311 ***	.265 **	-.367 ***
Global trait EI		.204 **	.553 ***	-.524 ***	.056	.372 ***	-.506 ***

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

We stated that both research samples showed statistically significant negative and moderate correlations ( $-.444 \leq r \leq -.269$ ) between Social Irritability and individual factors of trait EI, where it entered into a significant strong negative relationship with global trait EI, confirming the discriminant character of construct validity. In both cases, Empathy showed moderate to strong positive statistically significant correlations with individual factors ( $.224 \leq r \leq .536$ ). In the university students, the global level of trait EI entered into a moderate positive statistically significant relationship ( $r = .372$ ) with the Empathy dimension, while in the secondary school students it was a strong statistical relationship ( $r = .553$ ), which confirmed convergent validity. Manipulation showed correlations only with the factor of Sociability from the trait EI model, where a significant moderate positive relationship ( $r = .311, p < .001$ ) was found in the university students, while a strong positive relationship ( $r = .559, p < .001$ ) was revealed in the secondary school students.

*Q3: Which SI factors in the MESI scale can predict the global level of trait EI in the TEIQue-SF in two samples?*

Based on the significant correlations found between the trait EI factors and global level and the SI dimensions, we studied which MESI scale dimensions predicted the global level of trait EI in our research samples. The results of stepwise



linear regression for the dependent variable, the global level of trait EI and the independent variables Social Irritability, Empathy and Manipulation for both samples are presented in Table 3.

**Table 3.** Stepwise regression analysis

	Global level of EI					
	Secondary school students			University students		
Step 1	F(1,155)=58.279***, R2 adj. =.270			Step 1 F(1,137)=46.77***, R2 adj. =.250		
Step 2	F <sub>change</sub> (2,155)=72.510***, R2 adj. =.501, R2 change =.233			Step 2 F <sub>change</sub> (2,137)=20.89***, R2 adj. =.346, R2 change =.100		
Step 3	F <sub>change</sub> (3,155)=2.046, R2 adj. =.505, R2 change =.007			Step 3 F <sub>change</sub> (3,137)=.733, R2 adj. =.345, R2 change =.004		
	Beta	T	Partial correlations	Beta	t	Partial correlations
Social Irritability (Step 1)	-.524	-7.634***	-.524	-.506	-6.839***	-.506
Social Irritability	-.454	-7.932***	-.540	-.469	-6.741***	-.502
Empathy (Step 2)	.488	8.515***	.567	.318	4.571***	.366
Social Irritability	-.468	-8.085***	-.548	-.477	-6.789***	-.506
Empathy	.455	7.368***	.513	.307	4.348***	.352
Manipulation (Step 3)	.088	1.431	.115	.061	.856	.074

\*\*\* $p < .001$ ; R – multiple correlation coefficient; F – overall F-test value; R2 – determination index; p – overall F-test significance; R2adj. – adjusted determination index

The results of stepwise regression analysis indicate that in both research samples only 2 SI dimensions (Social Irritability and Empathy) of the MESI scale were involved, to a various extent, in determination of trait EI. In the university students, Social Irritability predicted up to 25% of the overall variance variability of global trait EI, and Empathy up to 10%. In the secondary school students, it was up to 27% in the case of Social Irritability and up to 23% in the case of Empathy. In both samples, stepwise regression analysis suggested similar determination of trait EI, but more significantly in the secondary school students. In both cases, both dimensions remained in a significant moderate to strong

relationship with the global level of trait EI also when the other two dimensions were controlled.

## **Discussion**

The issue of operationalization of the construct of intelligence does not lose its relevance for scientific and research studies in several branches of science, not excluding pedagogical sciences. The theoretical analysis of SI and EI constructs, as well as constructs of intelligence applicable also in the environment of education suggested certain mutual intersections anchored in the system theories of intelligence (Thorndike's, Gardner's, Sternberg's concepts of intelligence), in particular in their external influenceability and conditionality on the social environment and personality predispositions. The process of verification of the trait EI construct by questionnaires of the TEIQue series indicates its adequate psychometric properties. The properties of SI measuring tools, not excluding those designed in the Slovak conditions, should be verified accordingly. Frankovský and Birknerová's MESI scale (2014) was originally verified on 2135 respondents in the developmental period of adulthood ( $M_{\text{age}} = 27.43$ ,  $SD = 9.3$ ). In the replication study, its construct validity (verified by CFA and convergent and discriminant validity) was assessed in 2 developmental periods (adolescence and emergent adulthood).

We state that we verified the 3-factor structure of the MESI scale in both samples where it was possible to explain higher variability of variance in secondary school students. Also, estimation of reliability of three factors by means of internal consistency showed highly acceptable values. We point out to relatively low loading, in each developmental period, of the factor Social Irritability by items 10 (Weaknesses of others baffle me) and 18 (People who are willing to do anything for me make me nervous), where it is advisable to further modify and verify the wording.

Next, verification of the MESI scale construct validity was confirmed, its convergent and discriminant character, in relation to the factors and global level of trait EI from the TEIQue-SF in both research samples. Empathy entered into moderate up to strong significant positive relationships mostly with the global level of trait EI and factor Sociability mainly in the sample of secondary school students. On the other hand, Social Irritability entered into significant moderate up to strong negative relationships with all the four trait EI factors and its global level. Regression analysis confirmed significant mutual overlap of 3 MESI scale factors with global trait EI up to 50% in the sample of secondary school students

and almost 35% in the university students. The findings confirm our previous research analyses revealing that the TSIS questionnaire SI dimensions predict 54% of variability of global trait EI in adolescents and 40% in university students. The possibility to predict variability of global trait EI by SI dimensions indicates that adolescents can be predicted to a higher degree of variability in the variables under study. However, this finding must be verified on larger research samples.

To summarize, SI and EI show a certain degree of mutual complementarity also when assessed by various theoretical models. The fact remains that, on the basis of how they are defined, both intelligences must overlap to a certain extent. However, there is still room to assess their mutual differentiation. Thus, together with other researchers (Arghode, 2013; Petrides, 2009; Schultze, 2007; etc.) we see the primary difference between the intelligences under study in particular in the fact that EI is created both by intrapersonal and interpersonal factors relating to emotions, while SI is based on interpersonal components, where it is the awareness of the needs and problems of others and ability to respond or adapt to various social situations that is accentuated.

## **Conclusions**

In conclusion, the *MESI* scale can be considered to have a potential to reliably and validly assess three aspects of SI. At the same time, the obtained results confirm acceptable properties of the trait EI questionnaire *TEIQue-SF*. It is the reproducibility of research investigations that increases the probability that results will be universally valid, allowing for relevant diagnostics also in the environment of education. The simplicity of their administration and the reliability and validity of results from both research tools thus create a potential for competent teaching and professional staff at schools to make effective interventions in the development of learners' socio-emotional skills in the environment of education and subsequently determine effectiveness of such interventions.

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