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# Psychometric properties of the Slovak version of the Temperament and Character Inventory (TCI-R) – A preliminary analysis.

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## Abstract

**Introduction:** The Temperament and Character Inventory – Revised (TCI-R) is a multidimensional trait personality inventory based on the Psychobiological Model of Personality proposed by Cloninger. Several existing cultural/language adaptations and standardizations generally provide evidence for the validity and sound psychometric properties of the seven basic dimensions of the TCI-R although some of the facets show only acceptable alpha reliability. The present study is focused on the basic descriptive statistics and psychometric properties of the Slovak translation of the TCI-R. It presents preliminary findings from the first stage of the standardization process of the method for the Slovak population.

**Results and Discussion:** The seven main domains showed good to excellent alpha reliability levels, but for some subscales the alpha values were unacceptable. 26 items with less than acceptable item total correlation need to be reworded for future standardization process. Some of the dimensions were moderately intercorrelated, which contrasts with the underlying theory.

**Conclusion:** Item reformulation is needed to improve the alpha reliability of several subscales of the Slovak version of the TCI-R before the method can be validated in further research.

## Keywords:

Temperament and Character Inventory-Revised, TCI-R, psychometrics

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## Introduction

The Temperament and Character Inventory in the present revised form (TCI-R) is a multidimensional trait-based personality inventory based on the Psychobiological Model of Personality (Cloninger, Svrakic & Przybeck, 1993; see also Heretik, 2007; Preiss & Klose, 2001). The theory behind the TCI-R offers a convergent model of personality that brings together evolutionary, biological-genetic, psychological and social perspectives. Seven broad trait dimensions are proposed in the theory. As the name of the inventory suggests, the personality traits are divided into four temperament dimensions – Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD), and Persistence (PS) – and three character dimensions – Self-Directedness (SD), Cooperativeness (CO), and Self-Transcendence (ST). The idea of a temperamental basis of personality comes from some of the most influential theories in the area of personality research in psychology and related areas. These theories regard temperament as largely inherited biological predisposition manifesting from early developmental periods on and remaining relatively stable throughout the lifespan. Several different models of temperament have been developed (Blatný et al., 2010). Based on the Psychobiological Model of Personality, the domain of Novelty Seeking reflects individual differences in behavioral activation in novel situations and even looking for new, unexplored and risky stimuli. A high level of Harm Avoidance is thought to be associated with a tendency toward shyness, pessimistic worries and situational avoidance of situations viewed as potentially causing physical or mental harm. Reward Dependence is related to the intensity of behavior that can be described as sentimentality, social attachment, and dependence upon the approval of others. Persistence reflects the level with which the individual can endure fatigue and work continuously despite frustration and adverse conditions. In contrast to temperament, character personality traits have no substantial biological-genetic basis: They are developed mainly through the early development stage, influenced by one's social surroundings and experience. There are three character domains in the TCI model. The Self-Directedness domain represents the ability of an individual to control, regulate or adapt behavior to fit a particular situation in accordance with individually chosen goals and values. Cooperativeness reflects the tendency to identify and empathize with other people. Higher levels of Cooperativeness are also related to being compassionate and sympathetic toward others. Finally, Self-Transcendence is related to the individual level of spirituality, to seeing oneself as deeply connected to other people, nature or divine beings.

While theory behind the questionnaire has not changed greatly since it was first published, numerous versions of the Temperament and Character Inventory have been developed in the original language over the course of time by Cloninger and colleagues. The most recent version of the TCI-R consists of 240 items. Although about 40 items were changed, the revised inventory is mostly based on a previous version, the TCI (version 9). The main difference between the TCI and the TCI-R is that the original version consisted of dichotomous true/false items, while the TCI-R items are answered on a 5-point Likert scale (numbered plus supplemented verbal descriptions of scale points). The relatively high number of TCI-R items is due to the fact that the seven main domains are further divided into 29 subscales reflecting related but distinct parts of the seven broader dimensions (Table 1).

Table 1.

*Subscales of the seven main domains measured by the TCI-R*

Domain	Subscale 1	Subscale 2	Subscale 3	Subscale 4	Subscale5
<b>Novelty Seeking (NS)</b>	Exploratory excitability (NS1)	Impulsiveness (NS2)	Extravagance (NS3)	Disorderliness (NS4)	
<b>Harm Avoidance (HA)</b>	Anticipatory worry (HA1)	Fear of uncertainty (HA2)	Shyness (HA3)	Fatigability (HA4)	
<b>Reward Dependence (RD)</b>	Sentimentality (RD1)	Openness to warm communication (RD2)	Attachment (RD3)	Dependence (RD4)	
<b>Persistence (PS)</b>	Eagerness of effort (PS1)	Work Hardened (PS2)	Ambitious (PS3)	Perfectionist (PS4)	
<b>Self-Directedness (SD)</b>	Responsibility (SD1)	Purposefulness (SD2)	Resourcefulness (SD3)	Self-acceptance (SD4)	Enlightened second nature (SD5)
<b>Cooperativeness (CO)</b>	Social acceptance (CO1)	Empathy (CO2)	Helpfulness (CO3)	Compassion (CO4)	Pure-hearted conscience (CO5)
<b>Self-Transcendence (ST)</b>	Self-forgetful (ST1)	Transpersonal identification (ST2)	Spiritual acceptance (ST3)		

Numerous nationwide studies using translated versions of the TCI-R were published (Miettunen et al., 2006; Rózsa, 2015), including studies on Polish, Czech and Hungarian populations (Mikołajczyk et al., 2008; Preiss et al.; 2007, Rózsa et al., 2015) – countries that do not only share borders with Slovakia but also their social and cultural history. Studies of psychometric properties of the TCI-R have mostly supported the model, although some subscales showed only acceptable levels of alpha reliability, and there were repeated patterns of weak to moderate intercorrelations between different domains.

The goal of the present study is to report the basic descriptive psychometric properties obtained from the preliminary results of a validation study with the Slovak translation of the TCI-R (further referred as Phase I).

## Methods

The TCI-R was translated by the first author and reviewed by the second author of this study and back translated by a certified Slovak-English interpreter. To evaluate the translation during Phase I, we had originally about 350 participants complete the TCI-R together with basic socio-demographic descriptors (see Table 2). Subgroups of this sample also completed several other inventories focused on trait personality, well-being, personality disorders and social desirability, providing us with information on convergent and discriminant validity of the TCI-R. Analyses of these relationships, however, are out of the scope of the current study, and we plan to publish them in future.

The participants were students of distance and daily courses of study at the Dubnica Institute of Technology, Slovakia, who cooperated voluntarily during the lectures. Participation on the study was rewarded by credit points.

After removing incomplete responses, we were left with 335 participants. Out of these, additional fourteen (4.18% of the sample) were removed from the final analysis due to at least one incorrect answer on validity items serving as indicators of inattentive or care-less responding.

Table 2:

*Description of the sample (N = 321)*

Gender	N	%	Age	SD
Women	176	55%	M = 34.33	SD= 7.7
Men	144	45%	M = 34.47	8.7

## Results

Descriptive characteristics of the TCI-R domain scores are presented in Table 3.

Table 3:

*Means, medians and standard deviations of the main domains and subscales of the TCI-R (N = 321)*

Scale	Mean	Median	SD	Scale	Mean	Median	SD
NS1	31.4	31	4.54	SD1	28.45	29	4.53
NS2	23.65	24	4.38	SD2	23.08	23	3.29
NS3	26.75	27	6.07	SD3	17.71	18	3.42
NS4	18.82	19	3.97	SD4	29.31	29	7.21
<b>NS</b>	<b>100.63</b>	<b>101</b>	<b>11.46</b>	SD5	39.86	40	5.36
HA1	29.34	30	6.03	SD	138.41	138	16.96
HA2	20.96	21	5.19	C1	29.15	30	4.24
HA3	19.04	19	4.85	C2	17.28	17	2.84
HA4	20.15	20	5.34	C3	27.97	28	3.24
<b>HA</b>	<b>89.5</b>	<b>89</b>	<b>17.85</b>	C4	25.76	26	5.29
RD1	27.68	28	4.33	C5	27.42	28	3.82
RD2	35.47	36	5.18	C	127.59	128	14.2
RD3	19.73	20	4.18	ST1	28.43	29	5.8
RD4	19.15	19	3.2	ST2	20.62	20	5.1
<b>RD</b>	<b>102.03</b>	<b>102</b>	<b>11.24</b>	ST3	20.93	21	5.93
PS1	30.41	30	4.6	<b>ST</b>	<b>69.98</b>	<b>70</b>	<b>14.06</b>
PS2	28.2	28	4.59				
PS3	34.03	34	5.78				
PS4	26.94	27	4.66				
PS	119.58	119	16.76				

Next, we analyzed the main domains and subscales of the TCI-R using Cronbach's alpha reliability (Table 4). Alpha reliabilities for all seven main dimensions (domains) of

the TCI-R ranged from “good” reliability for Novelty Seeking ( $0.7 \leq \alpha < 0.9$ ) to “excellent” for Harm Avoidance and Persistence ( $\alpha \geq 0.9$ , Cortina, 1993). For most subscales, the alpha reliabilities were “good” to “acceptable”. However, for four subscales the internal consistencies were “poor”, and for another four subscales they were “unacceptable”, ( $\alpha < 0.5$ ).

Table 4:

*Alpha reliabilities for the main dimensions and subscales of the TCI-R (N = 321)*

Scale	$\alpha$	Scale	A	Scale	$\alpha$	Scale	A	Scale	A	Scale	$\alpha$	Scale	$\alpha$
NS	0.71	HA	0.90	RD	0.76	PS	0.91	SD	0.87	C	0.84	ST	0.87
NS1	0.55	HA1	0.70	RD1	0.61	PS1	0.66	SD1	0.67	C1	0.70	ST1	0.73
NS2	0.59	HA2	0.75	RD2	0.68	PS2	0.75	SD2	0.52	C2	0.52	ST2	0.72
NS3	0.76	HA3	0.78	RD3	0.71	PS3	0.82	SD3	0.69	C3	0.40	ST3	0.78
NS4	0.49	HA4	0.80	RD4	0.40	PS4	0.73	SD4	0.81	C4	0.83		
								SD5	0.72	C5	0.34		

The analysis identified 26 items with low reliability (Table 5). Most of the problematic items (9) belonged to the Cooperation subscale, five items with insufficient item-total correlations were found in the Self-Directedness and Reward Dependence subscales, and one was found in the Harm Avoidance subscale.

Table 5:

*The TCI-R items in the Slovak version 1 with less than acceptable item-total correlations (N=321)*

NS	HA	RD	PS	SD	CO	ST
NS1(53)	HA1 (161)	RD2(213)	PS1(134)	SD1(17)	CO1(203)	ST1(12)
NS1 (63)		RD4(11)	PS3(153)	SD1(167)	CO2(18)	ST3(232)
		RD4(26)		SD2(6)	CO3(7)	
		RD4(39)		SD2(57)	CO3(27)	
		RD4(85)		SD2(87)	CO3(84)	
					CO5(88)	
					CO5(141)	
					CO5(164)	
					CO5(187)	

Finally, we found numerous intercorrelations between the main domains of the TCI-R, some of them being moderate to strong (Table 6). There was a strong negative correlation between Harm Avoidance and both Persistence and Self-Directedness, and a strong positive correlation between Cooperation and both Reward Dependence and Self-Directedness. Additional weak to moderate correlations were found between Cooperativeness and five other domains. Novelty Seeking and Self-Transcendence correlated only weakly with other domains.

Table 6:

*Correlations between the seven major domains of the TCI-R (N = 321)*

	NS	HA	RD	PS	SD	CO	ST
NS	-						
HA	-.156**	-					
RD	.053	-.130*	-				
PS	-.120*	-.589**	.166**	-			
SD	-.257**	-.559**	.140*	.411**	-		
CO	-.221**	-.335**	.521**	.391**	.523**	-	
ST	.035	.000	.136*	.231**	-.296**	.117*	-

\*\* $p \leq 0.01$ , \* $p \leq 0.05$ .

## Discussion

Results of the preliminary analysis conducted during Phase 1 of the Slovak standardization project indicate that some of the items need to be reformulated to improve the reliability of some of the subscales. The Cooperation domain and its subscales showed the lowest alpha reliability, with most items showing poor item-total correlations. Correlations between several major dimensions were moderate to high, which is in discrepancy with the assumption of independent components and supports the idea of more “oblique” relationships between some of the main domains. Some of the correlations were higher than those reported as averages from numerous nationwide validation studies (Miettunen et al., 2008), but were very similar to those obtained during the psychometric evaluation of a recent Hungarian version of the TCI-R (Rózsa et al., 2015). This regards especially the moderate negative correlations between Harm Avoidance and both Persistence and Self-Directedness, and the weak to moderate correlation between Cooperation and Self-Directedness. Cooperation is a domain with significant weak to moderate correlations with all other domains except Self-Transcendence. In Phase 2 of the validation project, we plan to reformulate all problematic items and test them in an independent sample before we explore the psychometric properties of the Slovak TCI-R further through confirmatory factor analysis. Studies on various validity criteria will follow.

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