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Ten Item Personality Inventory: A Validation Study on a Croatian Adult Sample

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Abstract

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Considering the fact that the use of short measurement instruments is much more practical and cheaper, it is of utmost importance to create and validate them. Besides, within the limited time, researchers may need to apply a very brief measure. One of them is the very brief measure of the Big-Five personality dimensions, called Ten Item Personality Inventory. Therefore, the purpose of this study was to examine the construct validity and reliability of the Ten-Item Personality Inventory (TIPI) applied on a Croatian adult sample. After the translation of the original TIPI, it was applied on a sample of 432 adults who voluntarily participated in the research. The exploratory and confirmatory factor analyses with Principal Axis Factoring and Oblimin rotation were run with the reliability level analysis. The exploratory FA demonstrated the four-factor solution, which has explained 66.54% of the total variance. The confirmatory FA showed that the five-factor-solution explained 74.38% of the total variance. However, the determined factor structure was not clear and the proposed theoretical model of the Big Five was only partially confirmed. Cronbach alpha coefficient was $\alpha=.66$. Since the major loadings in the first factor were mainly situated on positively oriented items, this research confirmed prior findings about negatively oriented items as strong obstacles in the analysed factor structures. Therefore, the main conclusion of this research is to adapt TIPI in the way to create all ten items as positively oriented.

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1. Introduction

Methodological attempts to achieve the criterion of economy in creating and applying measures such as self-questionnaires has had a long history (Cohen, Manion & Morrison, 2007). One of these attempts is related to the need of shortening the administration time when exploring focus variables in a particular research. This need has arisen from the fact that sometimes researchers do not have enough time, or from the fact that participants do not have or do not want to or cannot spend a long time on



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filling in a certain questionnaire. Therefore, all these reasons support the continued effort to create economically and psychometrically adequate measures, especially in the field of personality psychology (Rammstedt & John, 2007). However, even if it was more than practical to ask just one question about individual personality, multiple-item scales showed a very dominant psychometrically superiority in relation to brief measures. Still, some of them such as Ten-Item Personality Inventory (Gosling, Rentfrow & Swann, 2003) have demonstrated satisfactory validity and reliability. This was intriguing enough to check TIPI's psychometric properties on an adult sample in Croatia.

1.1. Big-Five personality dimensions and their measurement

The Big-Five personality theoretical model has been the most empirically validated and the most used personality framework worldwide (Tatalović Vorkapić, 2014). It has presented one of the most significant personality theories in the 20th century (Mlačić, 2002). Its influence has been enormous since it presented the best answer on scientific discourse about the number of personality dimensions. On the other hand, although there are some arguments against its privileged status in personality psychology (Block, 1995; Tatalović Vorkapić, 2014), this theoretical model has been able to found the simplest way to be operationalized and measured. It presents the hierarchical model of personality traits that are included as the best descriptors of five much broader dimensions or domains: extraversion, neuroticism, agreeableness, conscientiousness and openness to experience. This theoretical framework is mostly descriptive with emphasized internal taxonomy (MacDonald, Bore, & Munro, 2008). These descriptors are adequately reflected through the language and behaviour, so *“structure of personality traits is placed in the structure of everyday language”* (Kardum & Smojver, 1993, p. 91) and *“trait measurements are grounded in information about behaviour”* (Lamiell, 2009, p.75). An extraverted person could be described as talkative, active, assertive, energetic, enthusiastic outgoing, warm, expressive, sociable, gregarious with positive emotionality. An individual with a high agreeableness is described as kind, trusting, sympathetic, generous, appreciative, forgiving, non-critical, compassionate and altruistic. A highly conscientiousness person is responsible, organized, planful, reliable, responsible, thorough, productive, ethical, self-disciplined and competent. A highly neurotic individual is anxious, tense, touchy, unstable, self-pitying, worrying, hostile, vulnerable and moody. A person with high openness to experience is imaginative, original curious, artistic, insightful, introspective and aesthetically reactive (John & Srivastava, 1999; McCrae & John, 1991).

With the aim of measuring the Big-Five dimensions, several measures have been developed. Costa and McCrae (1992) have created the NEO Personality Inventory and its revised version (NEO-PI-R), which has 240 items. It is very detailed since it measures the big five dimensions and their specific facets. It takes about 45 minutes to fill in this self-questionnaire due to its length. Later on, the same authors created a shorter measure, the NEO Five-Factor Inventory (NEO-FFI), which consists of 60 items. Furthermore, the Big-Five Inventory has been developed so that it contains 44 items (Benet-Martinez & John, 1998; John & Srivastava, 1999). Goldberg (1992) has developed a 100-item personality measure named Trait Descriptive Adjectives (TDA) that was shortened later on by Saucier (1994) from a 100- to a 40-item questionnaire. NEO-PI and BFI are adapted and validated in Croatia

(http://www.nakladaslap.com/testovi.aspx?cat=mguid_KPUpitniciIPostupciZaIspit). However, all of these measures take time to be applied, which implies at the need for developing a shorter one.

1.2. Ten-Item Personality Inventory – TIPI

Having the possibility to measure psychological constructs with short instruments presents the advantage not only for researchers who have a limited assessment time, but also for those who need to confirm or disconfirm theoretical models (Cloninger, 2009). Therefore, the benefits from designing short measures are multiple, and these brief instruments could be applied in longitudinal studies, large-scale surveys, clinical research, pre-screening packets and experience-sampling studies (Robins, Hendin & Trzesniewski, 2001).

Due to the psychometrical superiority of multi-item scales, one must think that there is no big number of short measures in psychology. However, this is not the case. Burisch (1997) has demonstrated that the brief depression scale had satisfactory psychometric properties, same as the long scales. Another example of a valid and reliable short scale is related to the field of self-esteem and it was developed by Robins and colleagues (2001). Within the field of personality psychology, three brief instruments have been developed: Big-Five Inventory-10 (Rammstedt & John, 2007); Ten-Item Personality Inventory & Five-Item Personality Inventory (TIPI & FIPI; Gosling, Rentfrow & Swann, 2003).

In the first case, Rammstedt and John (2007) selected two basic items for each personality dimension based on consensual expert judgment and the empirical item analyses for getting the descriptors of the core traits. So, they have selected two BFI-items for each personality domain parallel in two languages: English and German. In that procedure, they followed criteria such as choosing items that represented: the high and low poles of each factor; core aspects but not redundant of each domain; identical language versions; items that showed the highest correlations with the original BFI-scale; and items that related only to one expected factor, and not other four factors (Rammstedt & John, 2007). Discriminant and convergent validity and test-retest reliability were run on two students' samples in two time measurements: American sample ($N_1=726$ and $N_2=726$) and German sample ($N_1=457$ and $N_2=376$). Rammstedt and John (2007) determined that BFI-10 had satisfactory psychometric properties. However, they emphasized the psychometrical limitations of BFI-10, so it could only be used as an additional measure of personality and not as substitute for standard personality measures.

Furthermore, Gosling and colleagues (2003) on the sample of $N=1704$ and $N=1813$ students, with different sample groups in two time measurements, investigated the psychometric properties of the Five- and Ten-Item Personality Inventories. Both FIPI and TIPI were examined by running convergent and discriminant validity, and test-rest reliability. Unlike the selection criteria used by Rammstedt and John (2007), Gosling and colleagues (2003) used the criteria based on optimizing the content validity of FIPI and TIPI. Based on the suggestions of Goldberg (1992), Hazan and Shaver (1987) and John and Srivastava (1999) selected core items using the following directions: striving for breadth of coverage; identifying items that represented both poles of each domain; choosing those items that were not evaluative extreme; avoiding those items that were simple negations; and avoiding redundancy in

selected items. Determined psychometric properties of FIPI were less satisfying than the psychometric properties of TIPI. Besides, single-item scales are not able to control the acquiescence bias or to permit the researcher to check for errors. Therefore, in that case, as the brief scale of two items per personality domain, TIPI presented a better solution for measuring personality in a limited assessment time. Even though the limitations of short personality scales are obvious, the main contributions of using TIPI in personality research are: a) it is the best solution in studies where brevity is a very high priority (Saucier, 1994); b) its use provides an accumulation of research findings (Gosling, Rentfrow & Swann, 2003); and c) its item non-redundancy reduces the subjects' boredom, frustration and demotivation of participating in personality studies (Burisch, 1984).

2. Research aim, problems and hypothesis

The main aim of this study was to adapt and validate the Ten Item Personality Inventory (TIPI; Gosling, Rentfrow & Swann, 2003) on a Croatian adult sample. Regarding this aim, the following research problems related to TIPI were explored: a) its validity using the factor analysis; b) its reliability in calculating Cronbach alpha; and c) its descriptive parameters on an adult sample. It was expected to determine five-factor structure with a lower level of reliability since a very brief measure is applied. In addition, similar descriptive parameters as in prior studies have been expected to be determined.

3. Method

3.1. Subjects

In this pilot study, a total sample of N=432 teachers (4 males) self-estimated their personality on TIPI. This sample consisted of three subsamples (N=220; N=202; N=10) from the studies that were run for the purposes of three students' master theses. All teachers within these three subsamples participated at the same time from randomly chosen 24 kindergartens and 11 primary schools in Croatia (N=117 primary school teachers and N=315 preschool teachers). Since these subsamples were similar regarding all relevant variables (such as age, working experience, participation time, culture, (pre)school curricula), the following analyses were run on the total sample. The average age is M=39.11 years (SD=10.41) and it ranged from 22 to 64 years. The average working experience is M=16.12 years (SD=11.36), which ranged from 0 to 43 years. Teachers are working in these cities: Crikvenica (N=17), Grobnik (N=10), Kastav (N=52), Krk (N=23), Matulji (N=33), Opatija (N=56), Rab (N=24), Rijeka (N=195), Tribalj (N=6) and Viškovo (N=16).

3.2. Measure

The Ten Item Personality Inventory (TIPI; Gosling, Rentfrow & Swann, 2003) was applied in this study. Due to its adaptation into Croatian language, back-translation was done in cooperation with psychologists and experts of Croatian and English languages. The Croatian version of TIPI, the

instruction for using and scoring, can be seen in Appendix A. It consists of ten items that measure five personality dimensions: Extraversion (E), Agreeableness (A), Conscientiousness (C), Emotional Stability (ES) and Openness to Experience (O). Each dimension is measured by two descriptors, one of each pair is reverse-scored, as it is observable in Table 1. The common stem was used: “*I see myself as: ...*”. Participants should rate themselves on a 7-point scale ranging from *1-disagree strongly* to *7-agree strongly*. Since only two items are used for measuring each personality dimension, relatively low reliability levels are previously determined as Cronbach alphas: E=.68; A=.40; C=.50; ES=.73 and O=.45 (Gosling, Rentfrow & Swann, 2003).

3.3. Procedure

This research presents a set of three independent but coordinated studies within three students’ master theses. All of them were run at the same time (between February and June 2015) in 24 kindergartens and 11 primary schools in Croatia. The Faculty of Teacher Education approved data collecting in collaboration with participating kindergartens and primary schools. All kindergarten and primary school principals agreed to participate in this study. Data anonymity and confidentiality were guaranteed, and teachers participated voluntarily. It took about one minute to complete TIPI.

4. Results and discussion

4.1. Content validity

To explore the validity of the applied TIPI on the Croatian adult sample, two factor analyses were run and the final structure matrix of principal axis factors with Oblimin rotation, communalities and descriptives for each item are presented in the Table 1.

Table 1. Final structure matrix of Principal Axis Factoring: Openness to experience=1, Emotional stability=2, Extraversion=3, Conscientiousness=4, Agreeableness=5, with Oblimin rotation, Communalities and Descriptive for each item

Items	Principal axis factors							Descriptives	
	Dimensions	Communalities	1) Openness to experience	2) Emotional stability	3) Extraversion	4) Conscientiousness	5) Agreeableness	M	SD
<i>I see myself as:</i>									
5. Open to new experiences, complex.	1	.37	.72	.17		.19	.25	5.74	1.22
1. Extraverted, enthusiastic.	3	.34	.67		.36		.20	5.43	1.41
9. Calm, emotionally stable.	2	.37	.62	.33	-.31	.17	.36	5.68	1.25
7. Sympathetic, warm.	5	.38	.59			.41	.32	5.71	1.16
4. Anxious, easily upset.	2	.23	.23	.94			.36	2.79	1.69
2. Critical, quarrelsome.	5	.23		.32	-.53		.28	2.44	1.59
6. Reserved, quiet.	3	.13			.46			3.64	1.76
3. Dependable, self-disciplined.	4	.26	.34			.95	.22	5.78	1.35
8. Disorganized, careless.	4	.25	.20	.22		.18	.72	1.68	1.28
10. Conventional, uncreative.	1	.27	.35	.30			.60	1.92	1.42
Eigenvalues			2.88	1.48	1.28	1.00	.78		
Percentage of explained variance			28.85	14.80	12.85	10.04	7.84	74.38 %	

Before running the factor analysis, the negatively oriented items (2, 4, 6, 8, 10) were reversely scored. In the first step, the exploratory factor analyses with Principal Axis Factoring and Oblimin rotation with Kaiser Normalization was run. It was decided that this type of factor analyses would be applied since correlations between factors were expected. In addition, it was decided to present a structure and not a pattern matrix, because a pattern matrix is less stable from sample to sample and it requires a well-designed study with a sufficient sample size. This study is the first validation study of TIPI in Croatia, and its sample is relatively big. So, it may be considered a pilot study. Therefore, a structure matrix presents a better solution for this study and it shows zero-order correlations between factors and variables, and not regression coefficients (Kline, 2000; Sapp, 2006). The exploratory FA resulted with the four-factor solution, which has explained 66.54% of the total variance. Its structure matrix has shown highest loadings of all positively oriented items (1, 3, 5, 7, 9) on the first factor. Other three factors had loadings of separate negatively oriented factors (second factor: items 2 & 4; third factor: item 6; and forth factor: items 8 & 10).

However, due to the Big-five theoretical model that was in the background of this brief measure, the confirmatory factor analyses with Principal Axis Factoring and Oblimin rotation with Kaiser Normalization was run. Within this second step, it was specified to extract five factors. The determined five-factor solution has explained 74.38% of the total variance. Overall results of the confirmatory factor analyses can be observed in Table 1. Very similar to what was determined in exploratory factor analyses, the highest loadings were on the first factor. Items that were gathered around this factor are again positively oriented items. As it can be observed, generally items' communalities and loadings are not so high, and they are not structured as it was expected. On the other hand, even though the determined structure is not so clear, the bolded loadings showed that the expected five-factor groupings could be recognized at the latent level. Based on these bolded loadings, even though some of them are very low and with caution, the big-five structure could be defined. However, this was also expected based on Gosling and colleagues' observations (2003), since they warned about the questionable validity of this brief measure as explored by factor analysis. Therefore, the main conclusion regarding the first problem of this study was that the determined factor structure was not clear and the proposed theoretical model of the Big Five was only partially confirmed. Since the major loadings in the first factor were mainly situated on positively oriented items, this research confirmed prior findings about negatively oriented items as strong obstacles in the analysed factor structures. Therefore, the main conclusion of this research is to adapt TIPI in such a way so as to create all ten items as positively oriented. Besides this conclusion, additional guidelines for future research should be related with the same guideline stated from Gosling and colleagues (2003), the one within which the discriminant and convergent validity should be run, due to inferior content validity and internal consistency reliability of brief personality measures.

4.2. Internal consistency reliability

With the aim of analysing the internal consistency reliability, Cronbach alphas for all five TIPI-subscales and for the overall inventory were calculated. Negatively oriented items were also reversely

scored. As it was expected, low reliability levels were determined for each TIPI-subscale, as it can be seen in Table 2. Especially low reliability was found for the Agreeableness subscale, which is interesting. This finding could be explained by the possibility of poor translation, which should be taken into account in future research. The overall internal consistency reliability level calculated as Cronbach alpha coefficient was $\alpha=.66$, which was relatively satisfying. In comparison to previously presented Cronbach alphas of the original TIPI (Gosling, Rentfrow & Swann, 2003), it can be observed that the reliability levels in this research are lower in relation to the original ones. The greatest difference is between reliabilities of Agreeableness, and the greatest similarity is between reliabilities of Openness to experience. This again implies at the fact that the adaptation of the two Agreeableness items should be revised. Besides this implication, the other one derived from Gosling and colleagues (2003) should be taken into account too. Due to a small number of items it is logical to expect low levels of internal consistency reliability to be determined in a validation study. Therefore, they propose to run a test-retest reliability check, which should be done in the future validation research of TIPI in Croatia.

Table 2. Descriptives: Means (M), Standard deviations (SD), reliability coefficients Cronbach Alpha and Spearman correlation coefficients and significance levels for five TIPI-subscals

TIPI-subscals	Descriptives		Cronbach alpha	TIPI-subscals' correlations			
	M	SD		2	3	4	5
1.Extraversion	4.87	1.26	.36	-.03	.09	.20**	.34**
2.Agreeableness	5.64	1.02	.13	1.00	.35**	.40**	.33**
3.Conscientiousness	6.06	1.03	.38		1.00	.33**	.35**
4.Emotional stability	5.44	1.20	.46			1.00	.38**
5.Openness to experience	5.91	1.05	.41				1.00

* $p<0,05$; ** $p<0,01$

4.3. Descriptive parameters of the Big-five dimensions measured by TIPI

With the aim of answering the third study problem, basic descriptive and correlation research was run. Therefore, besides reliability levels, Table 2 also demonstrates the results from descriptive analyses of the applied TIPI. It can be seen that the determined means and standard deviations are similar to those determined in the original research (Gosling, Rentfrow & Swann, 2003). Based on the theoretical model of the Big-Five (John & Srivastava, 1999; McCrae & Costa, 1990, 2011), it was expected to determine high and statistically significant correlations between all five-personality dimensions. However, in this study, extraversion and agreeableness showed very small and statistically non-significant intercorrelations (Table 2). Different subscale intercorrelations imply a different structure of both: specific personality dimensions and the whole measure that tends to measure all personality domains. This finding again implies at the fact that both the validity and reliability of TIPI used in this study could be improved. Furthermore, detailed intercorrelations between all TIPI-items could be thoroughly observed in Table 3, especially those between two items that belong to a certain

personality dimension. Under the diagonal, the intercorrelations of TIPI-items from this research were presented, and above the diagonal the intercorrelations of TIPI-items from original research (Gosling, Rentfrow & Swenn, 2003) were presented. Intercorrelations between the items of the same personality dimension are shown in the grey cells. So, comparing these correlation coefficients, it is noticeable that they are all negative and statistically significant, which was expected. However, most of them are much bigger in the findings determined in the study of Gosling and colleagues (2003) than in the results found in this research. This comparison could be concluded with the statement that future research is definitely needed with specific modifications that should be implemented in the study design.

Table 3. Spearman's correlation coefficients between ten items of TIPI: under diagonal are coefficients from this study (N=432) and above diagonale are coefficients from original study (Gosling et al., 2003, p. 519; N=1799)

	tipi1	tipi6	tipi7	tipi2	tipi3	tipi8	tipi9	tipi4	tipi5	tipi10
tipi1	1.00	-.59**	.01	-.05*	.02	-.11**	.14**	-.23**	.16**	-.25**
tipi6	-.26**	1.00	-.02	.18**	-.04	.11**	-.09**	.03**	-.26**	-.08**
tipi7	.36**	-.01	1.00	-.36**	-.11**	-.09**	.01**	-.07**	-.04	-.09**
tipi2	.09	-.18**	-.11*	1.00	-.07**	.10**	-.24**	.13**	-.06**	-.19**
tipi3	.18**	.07	.42**	-.05	1.00	-.42**	.05*	-.06**	-.09**	.01
tipi8	-.12*	.04	-.29**	.17**	-.31**	1.00	-.15**	.06*	.03	-.18**
tipi9	.24**	.08	.39**	-.32**	.33**	-.31**	1.00	-.61**	.03	-.05*
tipi4	-.16**	.16**	-.09	.27**	-.15**	.22**	-.34**	1.00	-.21**	-.10**
tipi5	.48**	-.13**	.43**	-.08	.26**	-.18**	.36**	-.21**	1.00	-.28**
tipi10	-.24**	.11*	-.30**	.18*	-.16**	.44**	-.28**	.26**	-.33**	1.00

* $p < 0.05$; ** $p < 0.01$

5. Conclusion

Even though this is a very well known fact, this study has confirmed that the brief personality measure has some serious limitations. Firstly, both factor analyses failed to determine the expected Big-Five structure of the Ten-Item Personality Inventory. Put very cautiously, that Big-Five theoretical model operationalized and measured by TIPI on Croatian adult sample was only partially confirmed. Even though two items of each personality dimension could be recognized within the same factor, the greater loadings are at the first factor and they are situated on the most positively oriented items. Similar to this finding is the next one related to the second research problem – TIPI-reliability. Even though, there was no expectation of determining high levels of internal consistency reliabilities, those determined in this study are significantly low, especially the one related to the dimension agreeableness. Again, the determined descriptive parameters demonstrated different relationship of extraversion and agreeableness with other personality dimensions. In addition, the lowest negative correlation between two descriptors is the one determined at agreeableness dimension. Therefore, several limitations should be taken into account when designing a future validation study of TIPI in Croatia.

Firstly, it was clearly demonstrated that the idea about having two descriptors for each personality dimensions, of which one is negatively oriented, is not sustainable in the psychometrically point of view. Therefore, the TIPI-adaptation should be done with all items positively oriented.

Secondly, maybe there are flaws in translation that was done, so maybe the right approach to searching two main descriptors of five personality dimensions should be more empirically based and not only translation-based.

Thirdly, as Gosling and colleagues (2003) have proposed, psychometric properties of the brief personality measures should be tested using measures of convergent and discriminant validity and measures of test-retest reliability instead of using measures in this particular study.

Forthly, this study was run on a sample of adults but all teachers, mostly women. Therefore, a much more heterogeneous sample by variables should be used such as gender, age, education level and vocation.

Fifthly, even though this was a pilot study that used a relatively small sample of 432 teachers, in the future validation study, a bigger sample than this one should be used.

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Appendix A. Croatian version of the Ten-Item Personality Inventory – Hrvatska verzija Kratkog 5-faktorskog upitnika od 10 čestica

Pred Vama su određene osobine ličnosti koje se mogu i ne moraju odnositi na Vas. Molim Vas zaokružite onaj broj pored svake tvrdnje koji označava u kojoj mjeri se slažete ili ne slažete s tom tvrdnjom. Procijenite se ovisno o tome u kojoj mjeri se određeni par osobina odnosi na Vas, bez obzira ako se jedna osobina odnosi više ili manje od druge na Vas.

SEBE VIDIM KAO OSOBU KOJA JE:	1 – Uopće se ne slažem	2 – Umjereno se ne slažem	3 – Malo se ne slažem	4 – Možda, i slažem se i ne slažem se	5 – Malo se slažem	6 – Umjereno se slažem	7 – Potpuno se slažem
EKSTRAVERTIRANA, OTVORENA, ENTUZIJASTIČNA	1	2	3	4	5	6	7
KRITIČKI NASTROJENA, SVADLJIVA	1	2	3	4	5	6	7
POUZDANA, SAMODISCIPLINIRANA	1	2	3	4	5	6	7
ANKSIOZNA I KOJA SE LAKO MOŽE UZNEMIRITI	1	2	3	4	5	6	7
OTVORENA ZA NOVA ISKUSTVA, KOMPLEKSNA	1	2	3	4	5	6	7
REZERVIRANA, SUZDRŽANA, MIRNA	1	2	3	4	5	6	7
SIMPATIČNA, TOPLA	1	2	3	4	5	6	7
DEZORGANIZIRANA, NEPAŽLJIVA, NEMARNA	1	2	3	4	5	6	7
SMIRENA, EMOCIONALNO STABILNA	1	2	3	4	5	6	7
KONVENCIONALNA, NEKREATIVNA	1	2	3	4	5	6	7

Bodovanje: Ekstraverzija (1 i 6*); Ugodnost (2* i 7); Savjesnost (3 i 8*); Emocionalna stabilnost (4* i 9) i Otvorenost za nova iskustva (5 i 10*); (* - negativno orijentirane čestice koje se obrnuto boduju).