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Bojana Dinić[1]

Department of Psychology, Faculty of Philosophy, University of Novi Sad

COMPARISON OF THREE SHORT SIX-FACTOR PERSONALITY INSTRUMENTS[2]

The aim of this research was to validate Serbian adaptations of three short six-factor model measures: 24 Questionnaire Big Six (24QB6), Mini-IPIP6, and Brief HEXACO Inventory (BHI). Besides these measures, HEXACO-100 was applied on a sample of 310 participants (41% of male) from the general population. The results of confirmatory factor analysis showed marginal fit indices for 24QB6, and satisfactory fit indices for Mini-IPIP6, but not for BHI. BHI also had the smallest Cronbach's alphas for the scales, but the highest correlations with matching HEXACO-100 scales, confirming its convergent and discriminant validity. Regarding 24QB6, it was noticeable that all scales were valid, except for Honesty/Propriety, which showed substantial relations with both Honesty-Humility and Conscientiousness. Scales from Mini-IPIP6 had the highest alphas, but also the highest mean inter-item correlation, indicating that they measured a narrower scope of the traits. Also, validity of the Agreeableness scale was limited. Taken together, all the measures had advantages and disadvantages, and authors should choose a short measure in line with the importance of either validity or reliability.

Key words: short inventory, HEXACO, 24QB6, Mini-IPIP6, BHI

[1] Corresponding author email: bojana.dinic@ff.uns.ac.rs

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Since the past decade, short personality instruments have become more popular considering their efficacy and usefulness in large-scale studies. Most of the short personality measures operationalize the Big Five or Five Factor Model, but with the increased popularity of lexical six-factor personality models, there is a need for their brief measures. The most popular six-factor model is HEXACO (Ashton & Lee, 2007; Lee & Ashton, 2008), which contains Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience traits, with four facets per trait. Besides introducing the sixth factor Honesty-Humility, the differences compared to the Big Five model are in rearranging Neuroticism (called Emotionality in HEXACO model) and Agreeableness. Namely, Agreeableness from HEXACO model captures indicators of anger, impatience, hostility, and stubbornness, which are indicators of Neuroticism from the Big Five, while Emotionality captures empathy, sentimentality, and dependence, which are indicators of Agreeableness from the Big Five (Ashton, Lee, & de Vries, 2014; Lee & Ashton, 2008).

So far, three brief instruments have been proposed for the measurement of the six-factor model, which will be evaluated in this research. All three measurements have 24 items in the sentence format, with 4 items per scale. The first is 24 Questionnaire Big Six (24QB6: Thalmayer, Saucier, & Eigenhuis, 2011), which is the shortest version of Questionnaire Big Six (QB6), based on Saucier (2009) lexical research regarding personality structure. Saucier (2009) used a more inclusive criterion for adjective selection and reanalyzed 16 lexical studies conducted in 14 languages, which resulted in the six-factor structure: Honesty/Propriety, Resiliency vs. Internalizing Negative Emotionality, Extraversion (Gregariousness and Positive Emotionality), Agreeableness (Kindness & Event Temper), Conscientiousness, and Originality/Talent. The alphas of 24QB6 scales were in a range from .54 to .68, and scales showed predictive validity regarding some life outcomes, e.g. academic performance (Thalmayer et al., 2011).

At about the same time, Sibley et al. (2011) introduced a hybrid measure called Mini-IPIP6. Mini-IPIP6 comprised the Big Five measurement with an additional scale for assessing Honesty-Humility. The Big Five was operationalized via Mini-IPIP (Donnellan, Frederick, Oswald, & Lucas, 2006), and items for Honesty-Humility were reworded from the Honesty-Humility scale from the short version of HEXACO-PI-R (HEXACO-60: Ashton & Lee, 2009) and from the Narcissism scale developed by Campbell, Bonacci, Shelton, Exline, and Bushman (2004). Mini-IPIP was the short version of Goldberg's (1999) 50-item IPIP Big-Five factor markers, which was based on Goldberg's (1992) list of unipolar Big Five factor markers derived from lexical studies in English. Authors of Mini-IPIP6 did not provide alphas for Mini-IPIP6, but they confirmed its predictive validity regarding the time spent with friends, engaging in charity or voluntary work, religious status and identification, political affiliation, and attitudes about the environment. In an additional validation of the Mini-IPIP6, scale alphas ranged from .64 to .79 and score stability was confirmed (Milojev, Osborne, Greaves, Barlow, & Sibley, 2013), with the ex-

ception of the Neuroticism scale, while changes in Neuroticism was expected (Milojev, Osborne, & Sibley, 2014). Namely, scores on Neuroticism were changed as a result of resiliency following a natural disaster. Also, the scales showed good discrimination and information across the entire levels of trait (Sibley, 2012). Good alphas and an expected factor structure were confirmed in a study on a Serbian sample (Međedović & Bulut, 2017), along with the predictive validity of physical health and disintegration as an aspect of mental health.

The third instrument is the Brief HEXACO Inventory (BHI: De Vries, 2013), derived from the HEXACO Simplified Personality Inventory (HEXACO-SP: De Vries & Born, 2013). This is the only short measure based solely on the HEXACO model, with each item capturing one of the 24 facets (4 facets per trait). The HEXACO-SP was developed in order to be a more suitable measure of HEXACO dimensions among children and people with lower educational levels and language knowledge (e.g. the first-generation of ethnic minorities), thus containing short and easily comprehendible items. BHI scales had somewhat lower alphas, in a range from .43 to .72. However, BHI showed relatively good levels of test-retest stability (De Vries, 2013). It was important to note that BHI items were not the same as HEXACO-PI-R items. Correlations with corresponding HEXACO-PI-R were in a range from .59 to .83, with higher correlations in a student sample, compared to a community sample. So far, BHI has not been further tested, but recent research have confirmed lower alphas for eXtraversion (.59) and Conscientiousness (.51, see Oostrom, Köbis, Ronay, & Cremers, 2017).

The aim of this research was to explore the psychometric properties of three short six-factor measures, and test their convergent and discriminant validity in relations with the HEXACO-100 measure. This was the first study in which all short six-factor measures were included, and this way we could conclude which instrument had the best characteristics, or what their advantages and disadvantages were regarding psychometric properties. All three measures were expected to achieve a good model fit and show substantial correlations with matched HEXACO-100 scales (convergent validity), as well as lower (or non-significant) correlations with other scales (discriminant validity). While BHI is clearly based on HEXACO model, Thalmayer and Saucier (2014, pp. 483) state that "the QB6 scales are complementary to the HEXACO inventories", which makes HEXACO a suitable instrument for comparison with QB6. Although Mini-IPIP6 is a hybrid measure, it contains reworded items from Honesty-Humility scale from HEXACO-60, which set Honesty-Humility scale from HEXACO inventory as an adequate measure for determining its validity. The other relations between Mini-IPIP6 and HEXACO-100 should reflect the mentioned modifications in the HEXACO model compared to the Big Five model (Ashton et al., 2014; Lee & Ashton, 2008), e.g. that Neuroticism and Agreeableness from Mini-IPIP6 correlate with both Emotionality and Agreeableness from HEXACO-100. Also, it could be expected that Agreeableness from Mini-IPIP6 correlates with Honesty-Humility.

Method

Participants and procedure

The sample included 310 participants (41% male) from the general population in Serbia (aged between 18 and 68, *M* = 28.59, *SD* = 7.75). Data were collected online. 50 trained undergraduate students were instructed to find 6 participants each, who would participate in the online study (several students collected data from more than 6 participants). In order to obtain heterogeneity, requirements regarding sex and age quotas were given. These quotas were the following: 3 males, one of which was of age in a range 18-25, the other was in a range 26-35, and the third was 36 years old or more. The same quotas applied in the case of 3 female participants. If the students could not meet the given criteria, they were instructed to find participants regarding one of the criteria (and not both). Therefore, this is a nonrandom sample. The research was approved by the Institutional Review Board.

Instruments

Questionnaire Big Six - 24 (24QB6: Thalmayer et al., 2011). This is the shortest version of Questionnaire Big Six (QB6) based on Saucier's (2009) lexical research about personality structure. 24QB6 contains 24 items (4 per scale, with 2 negatively worded items in each scale), and measures six traits - Honesty/Propriety, Resiliency, Extraversion, Agreeableness, Conscientiousness, and Originality/Talent. In this research, the Serbian adaptation from Stankov, Saucier, and Knežević (2010) was applied, with the modification of three items (6, 17, and 23). These three items were modified due to QB6 development, and items used in this study reflected the final solution of 24QB6 presented in Thalmayer et al. (2011).

Mini-IPIP6 (Sibley et al., 2011). Mini-IPIP6 presents a combination of the 20-item Mini-IPIP (Donnellan et al., 2006) as a measure of the Big Five model (Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience traits) and the Honesty-Humility trait. The Honesty-Humility trait was measured via two reworded items from the Honesty-Humility scale from the HEXACO-60 (Ashton & Lee, 2009) and two reworded items from the Narcissism scale were developed by Campbell et al. (2004). In this research, the Serbian adaptation from Međedović and Bulut (2017) was applied, with the modification of two Agreeableness items (2 and 14)[3].

Brief HEXACO Inventory (BHI: De Vries, 2013). BHI is the short version of the HEXACO Simplified Personality Inventory (HEXACO-SP: De Vries & Born, 2013) which contains 24 items (4 per scale) and operationalizes the HEXACO personality model (namely, Honesty-Humility, Emotionality, eXtraversion, Agreeable-

[3] In the case of Serbian version of Mini-IPIP6, the originally and new translated versions of two items (2 and 14) made by the author of this research were applied, and items with the higher factor loadings on supposed factor were kept.

ness, Conscientiousness, and Openness to Experience traits). The Serbian adaptation of BHI was applied in this study for the first time. The back-translation of the Serbian adaptation of BHI was approved by Prof. De Vries.

HEXACO-100 (Lee & Ashton, in press, for Serbian adaptation see Međedović, Čolović, Dinić, & Smederevac, 2017, in press). HEXACO-100 measures six traits from the HEXACO model, with 16 items per trait and 4 additional items for measuring Altruism. Reliabilities of scales are good and range from .81 for Agreeableness to .86 for Conscientiousness.

All items were rated on a Likert scale, ranging from 1 = *totally disagree* to 5 = *totally agree*. Reliabilities for short measures in this study are presented in Table 1.

Data analysis

Firstly, Cronbach's alpha and mean inter-item correlations (MIC) as the measure of homogeneity were calculated for every short measure scale, as well as gender differences. In order to test the supposed six-factor structure with correlated factors, a confirmatory factor analysis (CFA) was conducted for each short measure. Since multivariate normality was violated for all the measures, robust diagonally weighted least squares (DWLS) estimator was used. Criteria for good model fit were CFI and TLI > .90 and RMSEA and SRMR < .08 (Hu & Bentler, 1999). Analysis was run in "lavaan" R package (Rosseel, 2012). Since BHI did not achieve acceptable fit indices, an exploratory factor analysis (EFA; principal axis method) with promax rotation was applied in order to explore its latent structure. EFA was run in IBM SPSS 22 for Windows. For determining the number of factors, the parallel analysis and the recommended 95% percentile criteria were used (e.g., Glorfeld, 1995). The parallel analysis was run in O'Connor (2000) syntax for SPSS with 1000 simulated data sets. Eigenvalues obtained from total variance instead from common variance, since syntax had problems with overestimating the number of factors in EFA models (e.g. Timmerman & Lorenzo-Seva, 2011). Convergent and discriminant validity correlations were calculated between the scales of short measures and HEXACO-100 scales and facets. In order to further inspect the validity of the short measures, a principal component analysis (PCA) with promax rotation was conducted on the scale scores of all three short measures and HEXACO-100 together. PCA was used in order to obtain the reduction of the space of variables and total variance. Parallel analysis was conducted to determine the number of components in the same way as in the case of EFA of BHI.

Results

Considering the small number of items per scale, Cronbach's alphas were acceptable, except for BHI Emotionality and Agreeableness (< .50, see Table 1). It could be noticed that Mini-IPIP6 had higher alpha coefficients for scales, com-

pared to the scales from other instruments, but also higher mean inter-item correlations (MIC). This could mean that the scales of Mini-IPIP6 were narrower regarding their scope, and that they did not cover all relevant indicators of the traits.

Consistent sex differences were found in Honesty-Humility and Openness to Experience across all three instruments, with females obtaining higher scores. Females also had higher scores on Resilience and Extraversion from 24QB6, on Agreeableness from Mini-IPIP6, and on Emotionality from BHI. Surprisingly, there were no significant sex differences in Mini-IPIP6 Neuroticism.

Table 1
Descriptives, Cronbach' alphas, and sex differences for 24QB6, Mini-IPIP, and BHI scales

			24QB6		
	α	MIC	Total	Male	Female
H/P	.52	.22	3.68(0.72)	3.47(0.70)	3.83(0.69)*
R	.63	.28	2.70(0.82)	2.53(0.76)	2.81(0.83)*
Ex	.54	.24	3.58 (0.71)	3.46(0.70)	3.67(0.71)*
A	.61	.21	3.07(0.80)	3.00(0.78)	3.11(0.81)
C	.72	.22	3.57(0.90)	3.56(0.93)	3.57(0.89)
O/T	.50	.30	3.66(0.65)	3.55(0.62)	3.73(0.67)*
			Mini-IPIP6		
H	.77	.45	3.11(0.99)	2.90(1.02)	3.25(0.95)*
N	.68	.35	2.88(0.84)	2.80(0.77)	2.93(0.89)
Ex	.81	.52	3.25(0.98)	3.21(0.97)	3.28(0.98)
A	.78	.47	3.83(0.79)	3.49(0.80)	4.06(0.70)*
C	.81	.52	3.67(0.98)	3.60(0.99)	3.72(0.97)
O	.78	.46	3.71(0.93)	3.49(0.98)	3.86(0.87)*
			BHI		
H	.63	.30	3.67(0.88)	3.14(0.93)	3.84(0.80)*
E	.47	.19	2.91(0.77)	2.61(0.75)	3.12(0.71)*
X	.65	.33	3.87(0.77)	3.81(0.75)	3.91(0.78)
A	.41	.15	2.97(0.68)	2.96(0.67)	2.98(0.68)
C	.70	.38	3.53(0.86)	3.53(0.91)	3.54(0.83)
O	.68	.35	3.68(0.87)	3.49(0.98)	3.81(0.75)*

Note. H/P = Honesty/Propriety, R = (lack of) Resiliency, Ex = Extraversion, A = Agreeableness, C = Conscientiousness, O/T = Originality/Talent, H = Honesty-Humility, N = Neuroticism, O = Openness to Experience, E = Emotionality, X = Extraversion. MIC - mean inter-item correlation as the coefficient of homogeneity.
* significant sex differences.

The CFA revealed marginal model fit for 24QB6, and acceptable model fit for Mini-IPIP6, while model fit for BHI was unacceptable due to CFI and TLI below cut-off criteria (Table 2, model parameters are given in Appendix).

Table 2
Fit indices for proposed six-factor structure of 24QB6, Mini-IPIP6, and BHI

Measures	DWLSχ^2(*df*)	χ^2/df	CFI	TLI	RMSEA (95% CI)	SRMR
QB6-24	453.36(237)	1.91	.88	.86	.05 (.05-.06)	.07
Mini-IPIP6	483.51(237)	2.04	.92	.91	.06 (.05-.07)	.08
BHI*	699.94(238)	2.94	.72	.68	.08 (.07-.09)	.09

Note. * item 17 had restricted loading (.99) due its original loading over 1.

In 24QB6 three items had a loading < .30 (10, 20, and 21), and the rest were in a range from .33 to .78. In Mini-IPIP6 loadings were high and ranged from .51 to. 92. In BHI item 17 from Emotionality factor had loading over 1, and after its restriction (on .99), loadings were in a range from .15 to .99, with clearly low item loadings in the Emotionality scale, except for item 17. However, model fit for BHI was unacceptable and did not achieve acceptable fit even after including correlations between residuals, , in line with the modification indices recommendations. Therefore, in order to gain an insight into BHI structure, an EFA was conducted (a principal axis factoring). Based on a parallel analysis, 6 factors were extracted (empirical λs obtained on overall variance were 3.56, 2.44, 2.20, 1.73, 1.48, 1.41, and for the 7th factor λ was 1.09, while simulated 95% λs were 1.62, 1.52, 1.44, 1.37, 1.32, 1.27, and for 7th factor 1.23). The obtained structure was in line with model assumptions, except for two items: item 6, which originally belonged to the Honesty/Propriety scale, but in EFA it was in the Agreeableness scale; and item 15, which had marginal loading on its corresponding factor Agreeableness (Table 3). Therefore, further analysis was conducted on the mean scores in order to compare measures.

Table 3
Pattern matrix of BHI

Item	Factor					
	C	X	O	H	A	E
2 Uvek se pobrinem da su stvari na svom mestu.	**.70**	.02	-.15	-.19	.15	.18
20 Često radim stvari bez razmišljanja.	**.68**	-.15	-.15	-.02	-.01	-.12
14 Kad radim, veoma sam precizan.	**.63**	.14	.05	-.06	-.01	.04
8 Odlažem složene zadatke što duže mogu.	**.60**	.04	.12	.01	-.17	-.14
16 Volim da pričam s drugim ljudima.	-.04	**.91**	-.07	-.07	-.04	.19
10 Lako prilazim nepoznatim ljudima.	-.12	**.57**	-.08	-.30	.00	-.09
4 Niko ne voli da priča sa mnom.	.17	**.48**	.04	.13	-.06	.01
22 Retko sam veseo.	.10	**.41**	-.01	.13	.02	-.25
13 Veoma sam maštovit.	-.09	-.01	**.75**	-.02	-.03	.09
19 Volim ljude koje imaju čudne ideje.	-.20	.00	**.70**	-.05	.05	-.01
1 Mogu dugo da posmatram neku umetničku sliku.	.15	-.15	**.59**	-.09	.05	.07
7 Mislim da je nauka dosadna.	.29	.11	**.37**	.07	.05	.03
24 Zaslužujem poseban status.	-.25	-.02	-.03	**.89**	.03	.00
18 Želim da budem slavan.	.12	-.14	-.12	**.54**	.08	.06
12 Voleo bih da znam kako mogu da dođem do puno para, iako to uključuje nepošten način.	.06	.18	.02	**.44**	.20	.06
21 Čak iako se prema meni drugi ophode loše, ostajem smiren.	.01	-.16	.10	-.09	**.64**	-.00
3 Ostanem neprijateljski raspoložen prema nekome ko je bio loš prema meni.	-.10	.11	.00	.14	**.42**	-.05
6 Ne mogu tek tako da lažem.	.06	.04	-.08	.18	**.40**	.15
9 Često kritikujem druge.	.03	-.06	.06	.24	**.37**	-.14
15 Sklon sam da se brzo složim s onim što drugi kažu.	-.11	-.07	-.15	-.12	.24	.10
17 Lako mogu da prevaziđem teškoće.	-.09	-.13	-.07	.19	-.25	**.54**
5 Plašim se da mogu osećati bol.	-.11	.01	.10	-.22	.08	**.46**
23 Moram da zaplačem tokom tužnih ili romantičnih filmova.	-.01	.21	.06	.09	.11	**.45**
11 Manje brinem od drugih ljudi.	.23	-.05	.11	.12	-.07	**.42**
% of common variance	12.29	7.90	6.77	4.85	3.59	3.41

Note. C = Conscientiousness, X = Extraversion, O = Openness to Experience, H = Honesty-Humility, A = Agreeableness, E = Emotionality. Loadings higher than ± .30 were bolded.

Convergent correlations with matching HEXACO-100 scales were mostly confirmed, with a few exceptions (Table 4). In the case of 24QB6, it could be noticed that Honesty/Propriety achieved the same correlations with both Honesty-Humility and Conscientiousness from HEXACO-100. Bearing in mind that the matching Honesty-Humility correlation was the smallest convergent correlation among 24QB6 scales, these results brought concerns due to the validity of the 24QB6 Honesty/Propriety scale. In the case of Mini-IPIP6, correlations of Neuroticism and Agreeableness scales were somewhat in line with theoretical expectations, with Neuroticism and Agreeableness from the Big Five corresponding to a combination of Emotionality and Agreeableness from the HEXACO-100. However, the correlation between Mini-IPIP6 Neuroticism and HEXACO-100 eXtraversion was almost in the same range as convergent validity correlation, which was not expected. Also, although Mini-IPIP6 Agreeableness had the highest correlation with HEXACO-100 Emotionality, it also correlated with Openness to Experience and Honesty-Humility almost in the same extent or even higher as with the matching Agreeableness scale. Of all instruments, BHI clearly showed the highest correlations with corresponding HEXACO-100 scales. This was expected, considering the conceptual similarities between the two instruments.

Table 4

Correlations between HEXACO-100 and three short HEXACO instruments - 24QB6, Mini-IPIP6, and BHI

	24QB6						Mini-IPIP6						BHI					
	H/P	R	Ex	A	C	O/T	H	N	Ex	A	C	O	H	E	X	A	C	O
H	**.41**	-.07	-.16	.30	.21	.09	**.69**	-.17	-.22	.28	.23	.14	**.74**	.14	.03	.25	.25	.22
E	.27	**.54**	.25	-.07	.05	.02	.09	**.37**	.02	**.43**	.08	.16	.17	**.64**	.04	.05	.04	.16
X	-.16	-.41	**.62**	.04	.18	26	-.08	-.38	**.78**	.14	.17	.08	-.10	-.26	**.76**	.05	.09	.02
A	.20	-.13	.21	**.59**	.07	.01	.26	**-.32**	-.03	**.26**	.10	.10	.28	-.06	.11	**.70**	.10	.15
C	.41	-.11	.15	.28	**.73**	.26	.15	-.24	.05	.22	**.74**	.15	.23	-.02	.19	.06	**.81**	.22
O	.12	.12	.18	.27	.04	**.57**	.26	-.04	.05	.36	.05	**.74**	.12	.14	.12	.13	.16	**.80**
Sincerity	**.23**	-.18	.08	.10	.11	.18	**.32**	-.14	-.09	.11	.13	.10	**.43**	-.03	.08	.01	.18	.11
Fairness	**.37**	-.01	.12	.23	.25	.08	**.41**	-.12	-.14	.25	.24	.12	**.53**	.14	.02	.24	.26	.18
Greed Avoidance	**.30**	-.00	.07	.31	.12	.07	**.74**	-.10	-.26	.21	.16	.16	**.61**	.18	-.04	.23	.16	.26
Modesty	**.27**	-.03	.20	.20	.09	-.13	**.50**	-.14	-.15	.23	.09	.00	**.55**	.10	.01	.24	.08	.05
Fearfulness	.27	**.47**	.04	-.08	-.02	-.06	.09	**.32**	-.13	.20	.07	.07	.13	**.51**	-.14	-.03	.04	.06
Anxiety	.23	**.54**	.02	-.10	.12	.05	.03	**.46**	-.01	.22	.13	.15	.13	**.55**	-.07	-.09	.13	.14
Dependence	.10	**.27**	.37	-.03	-.03	.02	.00	.16	.20	**.36**	-.03	.13	.01	**.35**	.17	.09	-.11	.12
Sentimentality	.22	**.36**	.28	-.00	.12	.04	.15	.21	.07	**.50**	.13	.14	.25	**.53**	.15	.14	.06	.17
Social Self-Esteem	-.01	-.50	**.41**	.10	.29	.25	-.02	-.45	**.50**	.07	.27	.05	-.02	-.29	**.53**	.12	.21	-.03
Social Boldness	-.22	-.25	**.39**	-.04	.09	.29	-.17	-.20	**.69**	.04	.09	.09	-.20	-.21	**.54**	-.10	.06	.06
Sociability	-.10	-.11	**.59**	-.09	.08	.10	-.07	-.10	**.65**	.21	.07	.02	-.08	-.04	**.64**	.02	-.00	.01
Liveliness	-.13	-.43	**.50**	.18	.14	.17	.03	-.47	**.51**	.11	.12	.07	.02	-.27	**.59**	.14	.05	.01
Forgivingness	.11	-.02	.18	**.36**	-.03	-.04	.16	-.15	.01	**.28**	.01	.04	.20	.02	.13	**.58**	.00	.12
Gentleness	.08	-.06	.16	**.36**	-.04	-.01	.13	-.15	-.03	**.22**	-.03	.07	.19	.00	.05	**.53**	-.07	.13
Flexibility	.16	-.18	.18	**.37**	.15	-.06	.23	**-.25**	.01	.11	.16	-.00	.20	-.11	.09	**.44**	.14	-.01
Patience	.24	-.14	.11	**.68**	.15	.11	.26	**-.39**	-.07	.15	.16	.17	.23	-.10	.04	**.51**	.23	.19
Organization	.32	-.08	.14	.17	**.77**	.07	.08	-.17	.04	.12	**.77**	.00	.18	.04	.18	.08	**.67**	.07
Diligence	.26	-.15	.23	.19	**.54**	.32	.12	-.24	.15	.17	**.52**	.20	.18	-.09	.28	.02	**.60**	.23
Perfectionism	.32	.07	.11	.16	**.47**	.28	.10	-.07	.06	.28	**.49**	.24	.15	.11	.14	.03	**.61**	.28
Prudence	.36	-.18	-.01	.33	**.47**	.15	.16	-.26	-.07	.11	**.49**	.04	.20	-.13	.02	.04	**.62**	.11
Aesthetic Appreciation	.20	.13	.12	.32	.06	**.37**	.32	-.01	-.03	.29	.10	**.53**	.22	.19	.04	.14	.17	**.60**
Inquisitiveness	.11	-.03	.11	.26	.17	**.34**	.11	-.19	.05	.17	.17	**.34**	.05	-.03	.08	.16	.27	**.49**
Creativity	.07	.13	.20	.14	-.03	**.51**	.20	.02	.05	.39	-.03	**.76**	.07	.17	.14	.06	.04	**.74**
Unconventionality	-.04	.12	.12	.12	-.09	**.58**	.19	.05	.08	.28	-.06	**.67**	.02	.10	.12	.06	.03	**.67**
Altruism (vs. Antagonism)	.37	-.07	.47	.26	.25	.29	.31	-.19	.12	.54	.27	.27	.46	.18	.31	.22	.26	.31

Note. H/P = Honesty/Propriety, R = (lack of) Resiliency, Ex = Extraversion, A = Agreeableness, C = Conscientiousness, O/T = Originality/Talent, H = Honesty-Humility, N = Neuroticism, E = Emotionality, X = Extraversion, O = Openness to Experience. All correlations > ± .12 were significant at $p < .05$, bolded correlations are convergent validity correlations.

Table 5
Pattern matrix of principal component analysis of 24QB6, Mini-IPI4, BHI, and HEXACO-100 scales

Instrument	Dimension	Component					
		C	X	O	E	H	A
25QB6	Honesty/Propriety	**.48**	-.14	-.09	.21	**.33**	.13
	(lack of) Resiliency	-.05	-.22	.05	**.80**	-.16	.02
	Extraversion	-.08	**.82**	-.01	.17	.14	.13
	Agreeableness	.17	-.12	.14	-.20	-.00	**.69**
	Conscientiousness	**.94**	.05	-.11	-.00	-.07	-.01
	Originality/Talent	.08	.17	**.79**	-.13	-.04	-.19
Mini-IPIP6	Honesty-Humility	-.15	-.04	.09	-.10	**.93**	-.08
	Neuroticism	-.15	-.18	-.00	**.66**	-.14	-.25
	Extraversion	-.04	**.88**	-.04	.02	-.20	-.08
	Agreeableness	.04	**.33**	.28	**.39**	.17	.18
	Conscientiousness	**.93**	.04	-.08	.02	-.04	-.01
	Openness to Experience	-.06	-.04	**.91**	.03	.01	-.03
BHI	Honesty-Humility	.02	-.00	-.12	.04	**.94**	-.05
	Emotionality	.02	-.02	.01	**.83**	.06	-.02
	Extraversion	.04	**.87**	.02	-.05	.04	-.05
	Agreeableness	-.08	.01	-.07	.08	-.11	**.93**
	Conscientiousness	**.94**	-.10	.07	-.04	-.04	-.03
	Openness to Experience	-.01	-.08	**.89**	.05	-.03	.08
HEXACO-100	Honesty-Humility	-.01	-.02	.01	-.06	**.92**	-.05
	Emotionality	.12	.23	-.05	**.89**	.03	.03
	eXtraversion	.02	**.88**	-.01	-.18	-.07	-.04
	Agreeableness	-.11	.02	-.03	-.04	-.04	**.95**
	Conscientiousness	**.90**	.00	.14	.01	-.02	-.09
	Openness to Experience	-.01	-.06	**.89**	.02	.01	.06
% of total variance		23.02	15.47	13.20	10.29	8.34	5.63

Note. C = Conscientiousness, X = Extraversion, O = Openness to Experience, E = Emotionality, H = Honesty-Humility, A = Agreeableness. Loadings higher than ± .30 were bolded.

In order to further inspect the validity of the scales, a principal component analysis (PCA) was conducted on the scale scores of all three short measures and HEXACO-100. Based on the parallel analysis, six components were extracted (empirical λs obtained on total variance were 5.53, 3.71, 3.17, 2.47, 2.00, 1.35, and for the 7th factor it was 0.68, while simulated 95% λs were 1.62, 1.52, 1.44, 1.37, 1.32, 1.27, and for 7th factor it was 1.23), and promax rotation was applied. The content of the components corresponded to HEXACO structure (Table 5). However, Honesty/Propriety from 24QB6 loaded on both the Conscientiousness and Honesty-Humility component. Also, Agreeableness from Mini-IPIP6 loaded on both the eXtraversion and Emotionality components, but these loadings were remarkably small. BHI and HEXACO-100 scales loaded on expected components.

Discussion

The aim of this research was to explore psychometric characteristics of Serbian adaptation of three short Six-factor measures: 24QB6, Mini-IPIP6, and BHI. All three measures showed advantages and disadvantages. 24QB6 showed marginal model fit, with three items having low factor loadings. These items were from different scales, but all of them were negatively worded and somewhat "difficult" to endorse, compared to the rest of the items from the same scale (for example, recoded item 10 had *M* = 3.47 while the rest of the items in the same scale had *M* in a range from 3.63 to 3.77). This affected the reliabilities of the scales, with scales containing these items showing somewhat smaller Cronbach's alphas (Originality/Talent, Extraversion, and Agreeableness). The alphas of the scales were in a range from .50 to .72, with Conscientiousness having the highest reliability, which mostly corresponded with previous research (Thalmayer et al., 2011). MIC coefficients suggested that there was a reasonable overlap among the items, with no redundancy. Regarding relations with HEXACO-100, there was clear overlapping with matching scales, except for Honesty/Propriety. This scale showed the same correlations with HEXACO-100 Honesty-Humility and Conscientiousness, and emerged in the Conscientiousness component in joined PCA analysis. The factor combining Conscientiousness and Negative Valence emerged in Saucier (2009) five-factor solution in lexical studies, and clearly these traits were related, at least in QB6. Moreover, in Thielmann, Hilbig, Zettler, and Moshagen (2017) study, it was shown that Honesty-Humility from HEXACO-60, and Honesty/Propriety from 30-item QB6, obtained the smallest trait-correlations, and that Honesty/Propriety showed limited predictive power for some conceptually relevant criteria, compared to Honesty-Humility. Namely, it seemed that Honesty/Propriety showed explanatory power for ethical risk-taking, but not for social risk-taking, or other aspects of Honesty-Humility domain such as fairness, dishonesty, narcissism, entitlement (Thielmann et al., 2017). Since Honesty/Propriety seemed relevant only

to ethical risks, it explained the relation with Conscientiousness which captured diligence, organization, perfectionism, etc. Results of this study showed that the content of Honesty-Humility and Honesty/Propriety was different, but further examination is needed, especially the examination of predictive validity.

Mini-IPIP6 showed acceptable model fit, and all items loaded substantially on the expected factor. Scales from Mini-IPIP6 had the highest alphas, but also a somewhat higher MIC coefficient, suggesting that redundancy between items could be the problem. This was the most obvious in Extraversion and Conscientiousness scales with MIC over recommended cut-off criteria (> .50, see Clark & Watson, 1995). This could mean that the Mini-IPIP6 scales captured a smaller number of traits' indicators, and that they had a narrower scope of measurement. Regarding relations with HEXACO-100, all the scales showed high correlations with matching scales, except Neuroticism and Agreeableness. Some differences in these two scales, compared to the scales from the HEXACO model, were expected and in line with rearranging these traits in the HEXACO model. Namely, Neuroticism and Agreeableness from the Big Five should correlate with both Emotionality and Agreeableness from the HEXACO model (Ashton et al., 2014; Lee & Ashton, 2008). However, other differences were not expected. The first was the negative correlation between Mini-IPIP6 Neuroticism and HEXACO-100 eXtraversion, which was as high as the correlation between Mini-IPIP6 Neuroticism on the one side, and HEXACO-100 Emotionality and Agreeableness on the other side. The correlation between Neuroticism from the Big Five Inventory and HEXACO-100 eXtraversion was also obtained in the previous research (e.g., Međedović et al., 2017, in press). Inspection of correlations with HEXACO-100 facets showed that Neuroticism was highly negatively related to the Social Self-Esteem and Liveliness facets of eXtraversion, which was in line with previous research (e.g., Međedović et al., 2017, in press), including the results that depression correlated more with eXtraversion (negatively) compared to Emotionality (Međedović, 2014). This confirmed that Neuroticism from Mini-IPIP6, besides anxiety and negative affectivity, also captured a lack of self-esteem and optimism, e.g. depressive affect, which was in line with theoretical expectations. However, it seemed that indicators of depression were more incorporated in the negative pole of HEXACO eXtraversion. The second unexpected high correlation regarded Agreeableness. This scale was mostly linked to Emotionality, especially to Dependence and Sentimentality facets, which was in line with theoretical expectations (e.g., Ashton et al., 2014) and previous research (e.g., Međedović et al., 2017). The relation with HEXACO-100 Agreeableness was also expected, although this relation could be higher. However, a somewhat higher relation with Openness to Experience was not expected, and this relation was mostly due to a higher correlation with the Creativity facet. It could be assumed that more agreeable persons were more attached to other people's emotions, and overall more open to emotional experience which was also present in creativity process, e.g. writing a novel. However, further examination of this relation is needed. In addition, PCA results showed that Mini-IPIP6 Agree-

ableness had marginal loadings on both Emotionality and eXtraversion components, but no significant loading on the Agreeableness component. It seems that Mini-IPIP6 Agreeableness content is closer to Emotionality, but also that there is no clear representation of this scale in the HEXACO space.

The most controversial of the obtained results were those related to BHI. Namely, BHI showed poor model fit and lower alphas, although EFA resulted in the expected factor structure with the exception of two items. However, MIC coefficients were appropriate, and more importantly, convergent and discriminant correlations with HEXACO-100 were excellent. So, BHI clearly captured HEXACO dimensions, although the reliabilities of some scales were not satisfactory. The relevance of the alpha in brief scales has been debated, especially in combination with relatively high test-retest stability (De Vries, 2013). However, caution is needed with the use of BHI regarding reliability.

There are several limitations to this study. Firstly, relations between short measures and other full length six-factor measures have not been examined in this study. In order to get a better insight into construct validity, relations with QB6 and Goldberg's 50-item IPIP Big-Five Factor Markers should be investigated. Secondly, for full validation, a predictive validity should be tested via relations with some life and behavior outcomes. Thirdly, due to non-random sampling, the generalizability of the results is limited. However, the sample covers sex and age quotas, which brings an appropriate heterogeneity to the sample. Also, obtained alphas are in the same range as in other studies which were conducted on both student and community samples (e.g., De Vries, 2013; Sibley et al., 2011; Thalmayer et al., 2011). Despite these limitations, this research has shown the advantages and disadvantages of every short six-factor measure. If some recommendations could be made, BHI should be preferred when validity is most important and the HEXACO model is of interest, but with caution. This is the first study to validate BHI in languages other than Dutch, so further validation is warranted.

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Appendix

Table A

Standardized item loadings and factor covariances for 24QB6, Mini-IPIP6, and BHI models

Standardized item loadings						Factor covariances					
24QB6		Mini-IPIP6		BHI		24QB6		Mini-IPIP6		BHI	
H/P		H		H							
5	.33	6	-.58	6	.45	H/P	~~	H	~~	H	~~
11	-.39	12	-.51	12	-.71	R	.05	N	-.22	E	.12
17	-.41	18	-.87	18	-.53	X	.14	X	-.24	X	.17
23	.67	24	-.72	24	-.51	A	.59	A	.33	A	.54
R		N		E		C	.72	C	.18	C	.34
6	.70	4	.74	5	.31	O/T	.07	O	.30	O	.17
12	-.48	15	-.52	11	-.24	R	~~	N	~~	E	~~
18	.52	16	.59	17*	-.99	X	-.36	X	-.22	X	-.39
24	-.43	17	-.50	23	.15	A	-.30	A	-.08	A	-.22
X		X		X		C	-.36	C	-.35	C	-.16
3	.63	1	.67	4	-.63	O/T	-.23	O	.00	O	-.02
9	.61	7	-.64	10	.33	X	~~	X	~~	X	~~
15	-.55	19	-.76	16	.58	A	.24	A	.15	A	.23
21	-.19	23	.82	22	-.70	C	.22	C	.08	C	.30
A		A		A		O/T	.40	O	.03	O	.21
2	.78	2	.65	3	-.47	A	~~	A	~~	A	~~
8	.57	8	-.74	9	-.57	C	.41	C	.23	C	.22
14	-.67	14	.59	15	.02	O/T	.32	O	.48	O	.39
20	-.13	20	-.76	21	.41	C	~~	C	~~	C	~~
C		C		C		O/T	.23	O	.02	O	.24
1	.68	3	.53	2	.56						
7	.59	10	.66	8	-.65						
13	-.60	11	-.78	14	.72						
19	-.66	22	-.91	20	-.50						
O/T		O		O							
4	.71	5	.51	1	.57						
10	-.22	9	-.69	7	-.67						
16	-.35	13	-.74	13	.58						
22	.54	21	-.76	19	.52						

Bojana Dinić

Odsek za psihologiju, Filozofski fakultet, Univerzitet u Novom Sadu

POREĐENJE TRI KRATKA INSTRUMENTA ŠESTOFAKTORSKIH MODELA

Cilj ovog istraživanja je validacija srpske adaptacije tri kratka instrumenta šestofaktorskih modela: 24 Upitnik Velikih šest (24 Questionnaire Big Six - 24QB6), Mini-IPIP6 i Kratki HEXACO inventar (Brief HEXACO Inventory - BHI). Pored ovih instrumenta, primenjen je i HEXACO-100 na uzorku od 310 ispitanika (41% muškaraca) iz opšte populacije. Rezultati konfirmatorne faktorske analize pokazuju marginalne indikatore fita za 24QB6 i zadovoljavajuće za Mini-IPIP, ali ne i za BHI. Skale BHI inventara imaju najniže alfa koeficijente pouzdanosti, ali najviše korelacije sa istoimenim HEXACO-100 skalama, što potvrđuje njihovu konvergentnu i diskriminativnu validnost. Validnost skala 24QB6 je potvrđena, osim za Poštenje/Poštovanje pravila, koje ostvaruje značajnu korelaciju i sa Poštenjem-Skromnošću i sa Savesnošću iz HEXACO-100. Skale Mini-IPIP6 instrumenta imaju najviše alfa koeficijente, ali ujedno i najviše prosečne inter-ajtemske korelacije (mera homogenosti), što ukazuje na to da ove skale zahvataju uži domen osobina koje mere. Takođe, validnost skale Prijatnost iz Mini-IPIP6 je ograničena. Generalno, sve tri mere imaju svoje prednosti i mane i autori bi trebalo da odaberu kratki instrument na osnovu toga da li im je važnija validnost ili pouzdanost.

Ključne reči: kratki inventar, HEXACO, 24QB6, Mini-IPIP6, BHI