Factor Structure and Measurement Invariance of the Values in Action Inventory of Strengths Reduced Set for Nine Arab Countries

Salama-Younes, M., Massoud, W., Fenouillet, F., Kharbouch, A., Eltahir, A., Alraheem, A., Kazim, A., Osman, A., Abu Ghali, E., Kerkouche, F., Yousfi, H., Goltan, H., Bia, J., Gady, N., Al Kafagy, N., Ahmed, N., Al-Arja, N., Elyahfoufy, N., Abdelati, S., Elgedawy, S., Al-Said, T., & Park, N.

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Abstract. Positive psychology has put forward in recent years a classification of character strengths to identify an individual's unique combination of virtues and attributes that contribute to their overall well-being and flourishing in life. To measure these strengths, the Values in Action Inventory of Strengths (VIA-IS) has been created and widely used. In the present study, we use Ng et al. (2017) VIA-RS Reduced Set (107 items) to explore the structure validity of an Arabic version. Confirmatory Factor Analysis (CFA) was conducted on data from nine Arab countries; four African countries (Algeria, Egypt, Morocco, Sudan) and five Asian countries (Saudi Arabia, Lebanon, Iraq, Oman, Palestine). Many factor models were tested, but only the four-dimension model showed a good fit. Measurement invariance was established across the countries, sex, and age groups. Results offered strong support based on strict tests for the factor structure of the reduced set. Consistent support was found for configural and metric invariance between countries, and scalar invariance was demonstrated under some circumstances. Support was also found for configural, metric, and scalar invariance for sex and age differences.

ملخص البحث. قدم علم النفس الإيجابي في السنوات الأخيرة تصنيفا للقوى الإيجابية في الشخصية لتحديد بنية العلاقة التي تربط الفضائل بالقوى الإنسانية والتي تساهم في الرفاهية الذاتية والازدهار في حياة الأفراد. ولقياس هذه القوى، تم بناء واستخدام مقياس القوى الإنسانية والفضائل (VIA-IS). وتستخدم الدراسة الحالية النسخة المنقحة المختصرة (VIA-RS) من هذا المقياس والمكونة من 107 بند والتي قدمها Ng وآخرون (2017)، وذلك بهدف التأكد من البنية العاملية للنسخة العربية للمقياس. وقد تم استخدام التحليل العاملي التوكيدي (CFA) على بيانات تم جمعها من تسع دول عربية؛ أربع دول أفريقية (الجزائر، مصر، المغرب، السودان) وخمس دول آسيوية (السعودية، لبنان، العراق، عمان، فلسطين). وتم اختبار ومقارنة العديد من النماذج العاملية، وقد أظهر النموذج رباعي الأبعاد فقط بنية عاملية مقبولة. كما قد تم كذلك اختبار تكافؤ المقياس عبر الدول والجنس والفئات العمرية. وأظهرت النتائج دعما قويا للبناء العاملي لهذا المقياس المنقح في نسخته العربية. ويمكن القول أن النتائج أيدت بشكل عام وجيد تكافؤ المقياس في التكوين العاملي بين الدول والجنس والعمر مع التحفظ على بعض الشروط.

Keywords: Factor Structure; Invariance of Measurement; Character Strengths; Arabic Version

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The Values in Action Inventory of Strengths (VIA-IS) is a self-report tool that measures an individual's 24 character strengths, which are classified into six virtues: wisdom and knowledge, courage, humanity, justice, and transcendence. The test, available online at www.viacharacter.org, has been taken by more than one million participants. It has been translated into at least ten languages, including Arabic (Niemiec, 2013). The VIA-IS list provides a common language for a strengths-based approach to character development. A "strength" is a capacity for feeling, thinking, and behaving in a way that allows optimal functioning in the pursuit of valued outcomes (Snyder et al., 2011). Recognizing individual strengths is valuable in clinical psychology, organizational management, and education, enabling individuals to build resilience, enhance workplace performance, and nurture talents. This concept promotes personal development and positive outcomes in various contexts, fostering well-being and success. As there are 24 strengths to include in the classification, various attempts have been made to reduce the list to streamline the assessment process, making it more practical and efficient for research, assessment, and application purposes, i.e., to focus on key strengths without overwhelming individuals with a lengthy assessment.

Dahlsgaard et al. (2005) undertook a literature review by reading the texts of influential religious and philosophical traditions from around the world and identified a core set of virtues acknowledged as important in all of them, and in which each virtue comprises several character strengths. The six identified virtues are (1) Wisdom and Knowledge: cognitive strengths that involve an individual's obtaining and usage of knowledge (creativity, curiosity, love of learning, judgment, and perspective). (2) Courage: emotional strengths that involve the individual's exercise of the will to accomplish goals in the face of opposition, either external or internal (bravery, honesty, industriousness, and zest). (3) Humanity: interpersonal strengths that require the individual "tending for and befriending" others (kindness, love, and social intelligence). (4) Justice: civic strengths that underlie a healthy community life among individuals (leadership, fairness, and teamwork). (5) Temperance: strengths that protect the individual against excess (caution, forgiveness, modesty, and self-control). Finally, (6) Transcendence: strengths that build connections to the larger universe and

provide meaning to an individual's life (beauty, gratitude, hope, humor, and spirit). These six virtues and their corresponding strengths comprise the assessment tool known as the VIA-IS.

The VIA's six virtues are considered universal across time and cultures, including in the Middle East/North Africa (MENA) region (Dahlsgaard et al., 2005; Peterson & Seligman, 2004). Many studies have examined its psychometric properties, factorial structure, as well as its demographic correlates in different countries such as the UK (Linley et al., 2007), India (Singh & Choubisa, 2010), Croatia (Brdar & Kashdan, 2010), China (Duan et al., 2012), Switzerland (Martínez-Martí & Ruch, 2014), Brazil (Noronha et al., 2015), USA (McGrath & Wallace, 2021), Italy (Feraco et al., 2022), Germany and UK (Partsch et al., 2022), United Arab of Emirates (Petkari et al., 2018) and Qatar (AlAhmadi, 2020).

Factor Structure of the VIA-IS

Most findings have revealed that four or five-dimensional models best fit the data. For example, in an American sample Peterson and Park (2012) identified five factors derived from EFA of the subscale scores. These factors were labeled as follows: strengths of restraint (fairness, modesty, forgiveness, prudence); intellectual strengths (e.g., creativity, curiosity, love of learning, appreciation of beauty, and excellence); interpersonal strengths (e.g., kindness, love, leadership, teamwork, humor); emotional strengths (e.g., bravery, hope, self-regulation, zest); and theological strengths (e.g., gratitude, spirituality). The authors stated that these factors were not identical to the VIA classification but were similar. Accordingly, the strengths of restraint corresponded to the strengths of temperance; intellectual strengths corresponded to strengths included in the virtue of wisdom and knowledge; interpersonal strengths corresponded to the strengths assigned to the virtues of humanity and justice; emotional strengths corresponded to those found in the virtue of courage, and finally, theological strengths corresponded to those strengths involved in the virtue of transcendence.

Using an Australian sample, a second-order factor analysis of the 24 character strengths produced both a one and four-factor solution (Macdonald et al., 2008). Using EFA, a five-factor solution was a more comprehensive and better representative of the resultant factor loadings upon analyzing the data in India (Singh & Choubisa, 2010). Yet, Shryack et al. (2010) argued that the dimensionality of the 24 strengths is not evident. They suggested either a three or four-dimensional model may provide a promising framework for future investigation. Brdar and Kashdan (2010) provided second-order principal component analyses of 24 strengths in Croatia. The initial extraction produced four factors with Eigenvalues exceeding 1. Using the parallel analysis, the same authors indicated a three-component solution. Three and four-factor solutions were compared, and the latter was chosen because it was interpretable and accounted for a greater total variance (60%). The four factors were named: interpersonal strengths, fortitude, vitality, and cautiousness. In Israel, Littman-Ovadia and Lavy (2012) performed a PCA and retained five factors using Varimax rotation (69.60% variance).

VIA-IS scales showed satisfactory psychometric properties for all 24 strengths with Cronbach's α generally higher than 0.70 (Azañedo et al., 2014; Khumalo et al., 2008; Littman-Ovadia & Lavy, 2012; Park et al., 2004). Using a large online sample with different translated versions of the VIA, McGrath (2015) identified a five-factor structure labeled as the following: strengths of restraint (which corresponds closely to virtues of courage and temperance), intellectual strengths

(correspond closely to virtues of wisdom and knowledge), interpersonal strengths (collapse the virtues of humanity and justice), emotional strengths (correspond to virtues), and theological strengths (included among our transcendence virtue). In addition, factor analyses of measures based on the classification usually suggest four or five factors that do not correspond well to traditional lists of virtues. McGrath (2019) suggested the emergence of the three-factor model may have potentially resolved the inconsistencies and unexpected findings in factor analytic results. He also concluded that those inconsistencies are potentially an artifact of the original VIA-IS, and other measures of the 24 strengths have tended to converge on a three-factor solution. Even data from the VIA-IS matches this pattern when constrained to a new version of three factors (McGrath et al., 2018).

Refinement of the VIA-IS

Given the inconsistent factor solutions and uncertainty about the six-factor solution suggested by Peterson and Seligman (2004), researchers have begun reviewing and addressing psychometric issues for the VIA-IS. Ng et al. (2017) sought to overcome these methodological challenges by applying the Exploratory Structural Equation Modeling (ESEM) at the item-level using a bifactor analytic approach to a sample of 447,573 participants who completed the VIA-IS with all 240 items and a reduced set (VIA-RS[1]) of 107 unidimensional character strength items. It was found that a six-factor bifactor structure mostly held for the reduced set of unidimensional character strength items.

Still, few studies have explored the structure of VIA-IS in African or Asian contexts (Khumalo et al., 2008; Shimai et al., 2006; Singh & Choubisa, 2010; Yasmin & Khan, 2017), including in any of the 22 Arab countries. Thus, we set our first goal to explore the structure validity of an Arabic version of the VIA-RS by testing its factor structure and internal reliability. Next, we sought to investigate the classification of the 24 strengths into one, two, three, four, five, or six virtue models of character strengths, having good internal consistency (α higher than .70) (Objective 1). Our second objective was to examine the measurement invariance for the dimensions (virtues) according to country, sex, and age (Objective 2).

The Present Study

Participants and Procedure

Data were collected in 2017 from nine Arab countries (n=7824) including Algeria, Egypt, Morocco, and Sudan, as well as Saudi Arabia, Lebanon, Oman, Palestine, and Iraq. Participants were recruited from Arab universities, while others were contacts (such as friends) of the participants. A few participants (4.0%) had a high-school education, 40.4% were university students, 47.7% had a university degree, and 5.9% had a Ph.D. degree (2.3% of the participants did not provide this information). Most participants (67.3%) were single, 14.4% were married, 15.8% were separated, and 1.6% were divorced (0.9% of the participants did not provide this information). Their ages ranged from 16-45 years (M=20.98, SD=2.56). The sample comprised of 5205 women (66.50%), and 2619 men (33.50%).

[1] VIA-IS = Values in Action Inventory of Strengths
VIA-RS = Values in Action Inventory of Strengths Reduced Set

Measure

Values in Action Inventory of Strengths-Reduced Set (VIA-RS; (Ng et al., 2017). The VIA-RS has 107 items across six dimensions (wisdom, courage, humanity, justice, temperance and transcendence, humanity), and an overarching general factor that is best described as dispositional positivity. This scale uses a 5-point Likert scale ranging from 1 (very much unlike me) to 5 (very much like me). Scores for each of the 24 strengths have a potential range of 4 to 20 or of 5 to 25, with higher scores indicating a stronger endorsement of a specific strength (Table 1). Subscale scores were averaged across items.

The original English inventory of the VIA-RS was translated into Modern Standard Arabic using the forward-backward translation. English items were translated into Arabic by two bilingual psychologists, who then discussed and agreed upon a common version. A bilingual translator, who did not know the original version, translated the Arabic version back into English. We compared this back-translation with the original items and the items were confirmed with the original ones. Each author interviewed 20 to 30 persons about the clarity of each item. A few minor changes were made to produce the final version.

Results

Structural Analysis

Since results were similar for both total and individual samples, we refer here to the results for the total sample. We examined the dimensionality of the VIA-RS and started with the simplest model comprising just a single factor. We performed the EFA using maximum likelihood method. Then, we ran several Confirmatory Factor Analyses (CFAs) in *Mplus 6.0* using Maximum Likelihood Robust (MLR) estimation, as MLR is the most accurate estimator when the distribution of scores slightly deviates from a normal distribution (Satorra & Bentler, 1994), which happened to be the case with the mean scores on the subscales.

To test the best model, we extracted the 24 strengths in one factor, which has more than a 1.00 Eigenvalue. The result shows one factor with Eigenvalues of 16.198 and 67.490% of the variance. Then, we performed the CFA to compare alternative models.

Table 1

Descriptive analysis of the 24 characters of strengths

Character of Strengths (*n* = 7824)	No. of items	M	*SD*	S	K	α
Creativity	*4*	*2.47*	*0.86*	*0.57*	*-0.07*	*0.76*
Curiosity	*5*	*2.42*	*0.82*	*0.70*	*0.20*	*0.77*
Judgment	*4*	*2.31*	*0.89*	*0.92*	*0.42*	*0.78*
Love Learn	*5*	*2.24*	*0.92*	*0.95*	*0.33*	*0.80*
Perspective	*5*	*2.41*	*0.87*	*0.64*	*0.03*	*0.82*
Wisdom	**23**	**2.37**	**0.77**	**0.93**	**0.51**	**0.94**
Beauty	*4*	*2.23*	*0.92*	*1.08*	*0.71*	*0.77*
Gratitude	*5*	*2.25*	*0.91*	*1.08*	*0.60*	*0.83*
Hope	*5*	*2.36*	*0.90*	*0.75*	*-0.01*	*0.79*
Humor	*5*	*2.29*	*0.93*	*0.87*	*0.21*	*0.83*
Spirit	*5*	*2.14*	*0.99*	*1.23*	*0.69*	*0.88*
Transcendence	**24**	**2.26**	**0.82**	**1.30**	**1.01**	**0.95**
Caution	*4*	*2.43*	*0.93*	*0.76*	*-0.03*	*0.75*
Forgiveness	*4*	*2.37*	*0.92*	*0.76*	*0.07*	*0.73*
Modesty	*4*	*2.55*	*0.84*	*0.49*	*-0.11*	*0.61*
Self-Control	*4*	*2.78*	*0.80*	*0.27*	*-0.26*	*0.51*
Temperance	**16**	**2.53**	**0.71**	**0.81**	**0.41**	**0.86**
Citizenship	*4*	*2.27*	*0.89*	*0.99*	*0.53*	*0.82*
Fairness	*4*	*2.22*	*0.95*	*1.13*	*0.75*	*0.81*
Leadership	*5*	*2.25*	*0.92*	*1.03*	*0.58*	*0.77*
Justice	**13**	**2.25**	**0.85**	**1.20**	**0.90**	**0.92**
Kindness	*5*	*2.27*	*0.90*	*1.19*	*0.91*	*0.79*
Love	*4*	*2.28*	*0.92*	*0.87*	*0.22*	*0.76*
Social Intelligence	*4*	*2.23*	*0.91*	*1.09*	*0.70*	*0.78*
Humanity	**13**	**2.26**	**0.84**	**1.27**	**1.02**	**0.91**
Bravery	*5*	*2.41*	*0.83*	*0.72*	*0.14*	*0.75*
Honesty	*5*	*2.04*	*1.00*	*1.40*	*1.11*	*0.89*
Industriousness	*4*	*2.36*	*0.87*	*0.76*	*0.17*	*0.74*
Zest	*4*	*2.36*	*0.91*	*0.74*	*0.03*	*0.76*
Courage	**18**	**2.29**	**0.80**	**1.16**	**0.82**	**0.93**
VIA-RS	**107**	**2.33**	**0.75**	**1.29**	**1.10**	**0.96**

Past studies have generally used indicators of 24-character strengths in the VIA-IS without confirming that they are unidimensional. The non-unidimensional facet scales can contain items that tap into more than one factor, resulting in a less clear factor structure that evidences poor model fit (Hopwood & Donnellan, 2010). Thus, we tested whether the VIA-RS is unidimensional.

Table 2

Descriptive analysis of the countries, gender, and age

	Wisdom			Courage			Temperance/ Transcendence			Humanity/Justice		
	M	***SD***	**A**	**M**	***SD***	**α**	**M**	***SD***	**α**	**M**	***SD***	**α**
Countries												
Algeria (*n* =784)	2.26	.52	.89	2.10	.47	.90	2.18	.38	.90	2.08	.45	.92
Egypt (*n*=1965)	2.45	.71	.88	2.35	.73	.89	2.48	.73	.86	2.32	.85	.87
KSA (*n*= 830)	2.09	.52	.89	1.97	.47	.87	2.05	.39	.91	1.91	.45	.90
Lebanon (*n*=793)	2.04	.48	.91	1.45	.44	.90	2.17	.40	.93	1.94	.42	.94
Morocco (*n*=443)	2.15	.43	.89	2.09	.45	.89	2.17	.36	.88	2.03	.40	.90
Oman (*n*=277)	2.08	.48	.92	1.96	.43	.87	2.00	.37	.93	1.92	.42	.94
Palestine (*n*=1163)	2.09	.54	.92	1.99	.51	.94	2.12	.48	.90	1.98	.49	.91
Sudan (*n*=769)	2.06	.58	.90	1.98	.52	.92	2.01	.47	.88	1.91	.51	.90
Iraq (*n*=800)	3.82	.50	.92	3.94	.48	.93	3.86	.44	.90	3.91	.49	.93
Gender												
Male (*n*=2619)	242	82		237	88		246	81		237	88	
Female (*n*=5205)	234	76		225	75		234	70		219	79	
Age												
<20 years (*n*=3786)	228	70		219	72		229	66		214	74	
≥20 years (*n*=4038)	245	82		238	86		246	80		236	89	
VIA-RS												
Total (*n*=7824)	**2.37**	**.77**	**.94**	**2.29**	**.93**	**.82**	**2.38**	**.74**	**.90**	**2.25**	**.82**	**.92**

Table 3

Correlation matrix of the four factors (n = 7824)

Variable	M	*SD*	Wisdom	Courage	Temperance/Transcendence
Wisdom	2.37	.77			
Courage	2.29	.80	.89*		
Temperance/Transcendence	2.38	.74	.88*	.90*	
Humanity/ Justice	2.25	.82	.87*	.90*	.93*

Note. $^{*}p < .01$

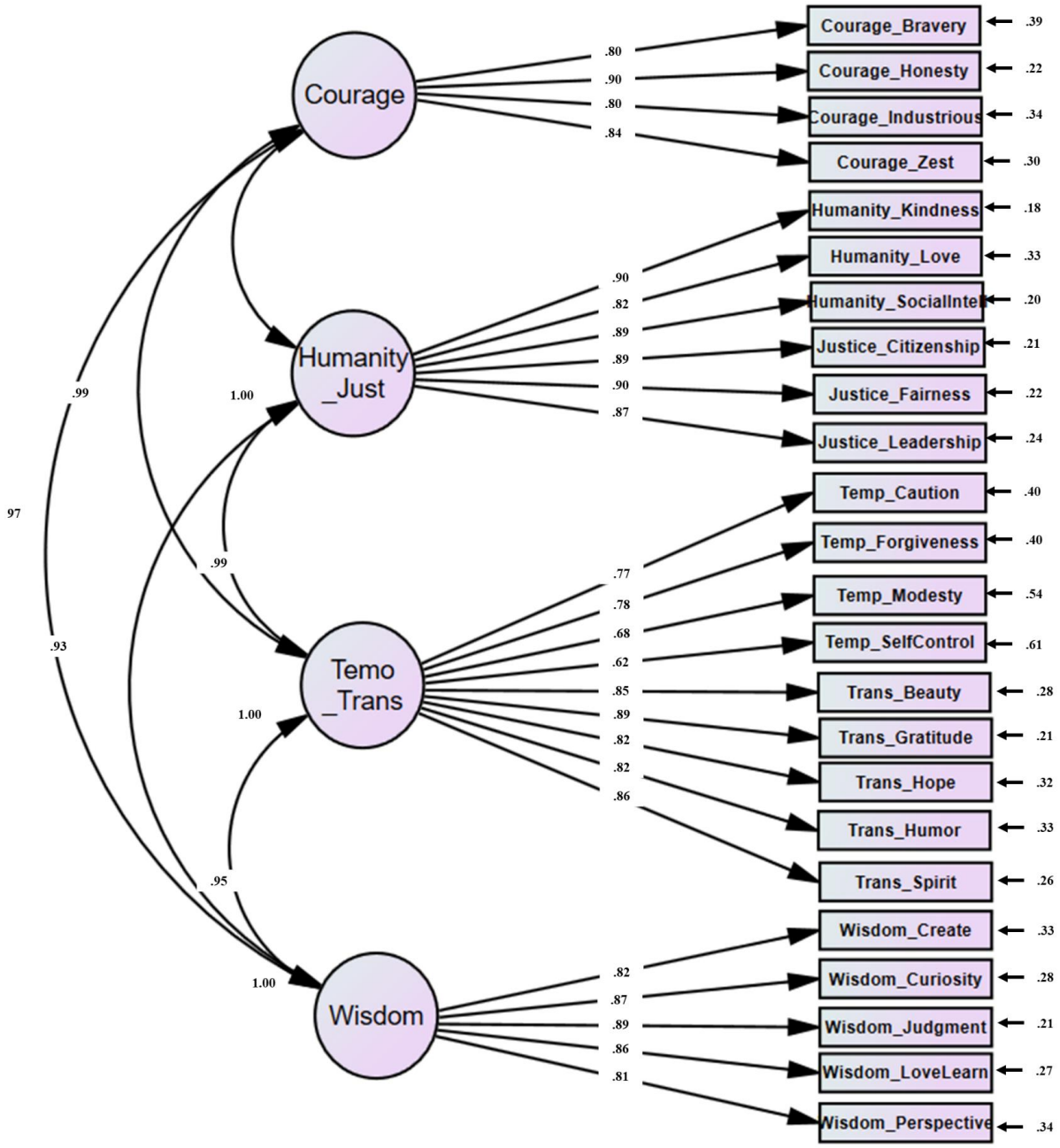
The CFA analysis allows performing one, two (Courage/Wisdom vs. Temperance /Transcendence /Humanity /Justice), three (Courage vs. Wisdom vs. Temperance /Transcendence /Humanity /Justice), and four-factor (Courage vs. Wisdom vs. Temperance/Transcendence vs. Humanity/Justice) models. However, it has not been possible to calculate five and six-factor models because of the high collinearity between the 24 means of strengths that cause calculation errors in these models. The set of indicators highlights that the 4-factor model is the best fit for data. For that, we present here only the figure of the 4-factor model. They were 'wisdom,' 'courage,' 'temperance and transcendence,' and 'humanity and justice.' The present results are similar to the findings of Peterson and Park (2012) in that some strengths composing the justice and humanity factors are together saturated with the American sample.

Measurement Invariance

We examined the configural, metric, and scalar invariance to find whether the constructs are conceptualized in the same way other studies have found (Meredith, 1993; van de Schoot et al., 2012), i.e., whether the number of factors and the pattern of factor loadings are roughly equivalent across groups, a condition called configural invariance. This model is not an actual invariance model. However, its fit must be first evaluated. To compare relations between variables across groups, we studied whether, for all groups of participants, the meaning can be recognized to the latent construct under investigation (i.e., whether the factor loadings are equal across groups; metric invariance/weak invariance). Thirdly, we studied whether the constant (intercept) and weights (factor loadings) are equal across the groups when items are written as a linear combination of the latent factors (i.e., scalar invariance). If such a model fits, factor loadings and item intercepts are invariant over groups, and changes in the latent factor can reasonably be interpreted as changes in the latent constructs, as they have been corrected for measurement error. To evaluate the model fit, the use of multiple criteria can provide information on the different sources of model misspecification. Because the Chi-square can be overly sensitive to sample size and model complexity (Iacobucci, 2010), we relied on four other commonly used fit indices that are, the Comparative Fit Index (CFI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Squared Residual (SRMR) and Tucker Lewis Index (TLI). For the fit comparisons of the alternative models, we used the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). The Chi-square value should be as low as possible and preferably non-significant.

Figure 1

VIA-RS model of four factors



Regarding 0.90 CFI and TLI, they represent an acceptable fit, and 0.95 good fit. RMSEA should not exceed .06 in a well-fitting model, and SMSR should not be larger than .08 in such models (Hu & Bentler, 1999). AIC and BIC should be as low as possible. We regarded metric invariance as established if the difference in CFI (ΔCFI) and TLI (ΔTLI) between models with group-specific or common factor loadings was smaller than .010, ΔRMSEA was smaller than .015, and ΔSRMR was smaller than .030. We regarded scalar invariance as established if ΔCFI, ΔTLI, ΔRMSEA, and

ΔSRMR between models with groups' specific or common intercepts were smaller than .010, .010, 0.15, and 0.10, respectively.

According to the CFA, the 4-factor model is used as a reference model for the analysis of the variance of the measure since it appears that it is the best model among the four considered. We tested configural invariance, whether the same configuration holds across groups. We then tested metric invariance, by constraining pattern coefficients between each item and its underlying construct to be equal across groups. Furthermore, we tested strict invariance by constraining item residuals across groups. When testing measurement invariance, Cheung & Rensvold (2002) suggested comparing the ΔCFI statistics of the baseline model with constrained models. Following these recommendations, we applied the guidelines for model comparisons based on CFI to the TLI. An advantage of the TLI is that it integrates control for parsimony, whereas the change in CFI does not, making TLI particularly relevant to model comparisons (Marsh et al., 2013). The invariance was examined through the ΔCFI, ΔRMSEA, and ΔSRMR. The criteria for invariance are ΔCFI≤.01, ΔRMSEA≤.015, and ΔSRMR≤.03.

We first evaluated the measurement invariance of the four-factor model across the nine subsamples. The goodness of fit for the configural model was almost the same as that for the cross-validation subsample. None of the fit indices varied by more than .001 from those of the entire cross-validation sample. The findings reinforced the metric invariance in this analysis. RMSEA and TLI values improved, as did the BIC and sample-adjusted BIC. Deterioration of the CFI and SRMR was minimal, and the CFI was less than .001. The increase in the AIC relative to the total value was also minimal. Scalar invariance statistics were consistently weaker than those who were for the metric analysis, but all remained in the acceptable range. CFI was just .01 below that of the configural model, and values for the two BIC indices were lower than those for the configural model. The finding that intercepts and loadings can be fixed across countries with little impact on model fit suggests the VIA results can reasonably be interpreted as equivalent in meaning across countries.

In summary, we can see the metric invariance is respected, although the ΔCFI is slightly at .01 (ΔCFI=.016), as far as the scalar invariance is not respected on almost all the goodness of fit. The present research result is similar to McGrath's (2016), who evaluated the measurement invariance between 16 different nations finding support for configural and metric invariance. Scalar invariance was similarly demonstrated under some circumstances.

Table 4

Measurement Invariance across countries, gender, and age

Model	χ2	*df*	CFI	TLI	RMSEA	SRMR	ΔCFI	ΔTLI	ΔRMSEA	ΔSRMR
					Countries					
Configural invariance	10068.4	2214	.916	.906	.064	.045				
Weak/ Metric invariance	11793.42	2374	.900	.895	.068	.073	.016	.011	.004	.028
Strong/ Scalar invariance	14258.57	2534	.875	.878	.073	.088	.041	.028	.009	.043
					Gender					
Configural invariance	784.56	492	.953	.947	.062	.026				
Weak/ Metric invariance	8063.87	512	.952	.948	.061	.03	.001	.001	.001	.004
Strong/ Scalar invariance	8678.26	532	.948	.946	.063	.034	.005	.001	.001	.008
					Age					
Configural invariance	8035.35	492	.952	.946	.063	.026				
Weak/ Metric invariance	8149.45	512	.951	.947	.062	.027	.001	.001	.001	.001
Strong/ Scalar invariance	8395.24	532	.95	.948	.061	.028	.002	.002	.002	.002

All Chi squares were significant (p<.001)

The next two sets of analyses examined the measurement invariance across females (n=5205) vs. males (n=2619) and across different age groups (<20 years=3786) vs. (≥20 years=4038). The pattern described for age was essentially replicated with small variations, though the deterioration in fit indices was slightly higher. For example, the CFI for gender invariance declined by .001 when comparing configural and scalar models. All fit indices remained in the acceptable range. In no cases did the result show a substantial decline in the fit when the invariance constraints were tightened. In conclusion, the configural, metric, and scalar invariance is respected in both sex and age differences.

Discussion

In response to the first objective, the current research evaluated whether a model of character strengths could be derived from psychological self-report data that corresponds with longstanding cultural beliefs about virtue. Although Arab countries speak the same language with different dialects, there is no instrument to evaluate the strengths and virtues in Arabic that studies factor structure and measurement invariance of VIA-RS with Arabic-speaking participants. Thus, the dimensionality of the Arabic version of both instruments is still in question. Given the inconsistent factor solutions and uncertainty about whether a six-factor solution was implicated by Peterson and Seligman (2004), we moved forward by testing the factor structure and internal consistency of the VIA-RS that may be distorting the underlying factor structure, which confirmed the 24 strengths but the four-factor solution that corresponds to the collected data. In the current research, these were courage, wisdom, transcendence-temperance, and humanity-justice. The internal consistency for the 24 strengths is the same as that found in previous studies (Harzer & Ruch, 2013; Ruch et al., 2014; Shimai et al., 2006).

According to Ng et al. (2017), a 24-factor solution using CFA on the 107 items did not show adequate fit (CFI=.85, TLI=.84, RMSEA=.03, and SRMR=.05), nor did a hierarchical model with 24 first-order factors, six second-order factors representing the virtues, and the third-order factor representing an overarching "character" factor (CFI=.79, TLI=.79, RMSEA=.04, and SRMR=.07). Models resulting from using CESEM confirmed that a 24-factor model was on the verge of attaining acceptable fit (CFI=.90, TLI=.89, RMSEA=.03, and SRMR=.03). With a large sample who completed the VIA-IS with all 240 items (24 strengths), Ng et al. (2017) refined a reduced set of 107 unidimensional character strengths (24 strengths).

Regarding the second objective, i.e., measurement invariance, the study found that the configural, metric, and scalar invariance were respected across genders and age differences. Multiple criteria were employed to assess the model fit relying on commonly used fit indices. The guidelines for model comparisons were based on CFI, where a ΔCFI≤.01, ΔRMSEA≤.015, and ΔSRMR≤.03 were considered indicative of invariance. The results indicated that the metric invariance was upheld with a ΔCFI=.016, slightly above the suggested criterion of .01. However, the scalar invariance was not supported across all goodness of fit measures. Nevertheless, it remained within an acceptable range and was consistent with findings from a prior study under certain circumstances, which further supports the findings of this study. In conclusion, this study demonstrates that the configural, metric, and scalar invariance are observed across genders and age differences.

Limitations and Future Directions

The previous results suggest that the assumptions of CFA might be overly restrictive for the VIA-IS, given the inconsistency of findings. CFA makes the strict assumption that items can only load on their respective factors, and they may fail to account for two main sources of construct-relevant dimensionality in complex scales like the VIA-RS, potentially resulting in biased parameters (Morin et al., 2016). It could be interesting to explore the item loading on its respective factor in future research. The limitation of this study is the specificity of the sample since more than half of the Arabic countries did not participate in this study. Also, we did not study any socio-demographic factors that could affect the perception of some character strengths.

The initial psychometric data presented here are promising, but more work on validity is needed. It will be important to determine the associations of the Arabic version of VIA-RS with non-self-report instruments of the same concepts, for example, ratings from peers. It will also be good to establish the stability of the scales over time. Factor structure, internal consistency, and measurement invariance are only the first steps in validating an instrument. As a next step, we suggest examining the instrument structure following both variable-centered and person-centered approaches. It would also be interesting to study the extent to which the four factors differently predict various behaviors such as positive emotion, life satisfaction, and vulnerability.

Conclusion

Our findings did not support the theoretically hypothesized six virtue cluster model of character strengths. The VIA was almost unidimensional rather than multi-dimensional (Partsch et al., 2022; van Eeden et al., 2008); 5 dimensional (Park & Peterson, 2006), or with five strength factors (Arbenz et al., 2023; Azañedo et al., 2021; McGrath, 2023; McGrath & Wallace, 2021; Ruch et al., 2010; Toner et al., 2012). Najderska and Cieciuch (2018) used the International Personality Item Pool-Values in Action (IPIP-VIA) questionnaire in Poland. The scale-level results indicated a four-factor structure that can be interpreted based on four of the five personality traits from the Big Five Theory (excluding neuroticism). The item-level analysis suggested a slightly different and limited set of character strengths (17 not 24). The second-order analysis indicated that a four-factor structure emerged, and three of the factors could be interpreted as being consistent with the scale-level factors.

To summarize, no published study on factor structure and measurement invariance of VIA-RS has been conducted with Arabic-speaking participants. Thus, the dimensionality of the Arabic version of both instruments is still in question for this linguistic group. In this study, we were interested in examining the factor structure of the VIA-RS. For that, many CFA models have been performed with nine diverse samples on the African and Asian continents. Results confirmed the excellent fit of the four-factor model composing the 24 strengths and supported the conclusion that the character strengths could be measured by the Arabic version of VIA-RS. The combination of temperance and transcendence also shows strengths that protect and build connections to the larger universe and provide a sense of purpose and meaning in life. We hope our findings can help put some of the controversies over the factor structure of the Arabic version of the VIA-RS to rest, although this must be replicated and retested.

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