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Factor structure of character strengths in youth: Consistency across ages and measures

Robert E. McGrath[a] and David Ian Walker[b]

[a]School of Psychology, Fairleigh Dickinson University, Teaneck, NJ, USA; [b]Jubilee Centre for Character and Virtues, University of Birmingham, Birmingham, UK

ABSTRACT

The VIA Classification of Strengths and Virtues attempts to provide a comprehensive model of character based on 24 character strengths. The present study is the largest study to date exploring the structure of the 24 strengths in youth. One sample ($N = 23,850$) completed the VIA-Youth, a teen measure of the VIA Classification. Based on a random subsample, it was determined the data were best modeled using four factors. The remainder of the sample was used to demonstrate measurement invariance for the four-factor model across ages 10–17 and country. Comparison with 471 English academy school students who completed two alternate measures of the VIA Classification also demonstrated measurement invariance. The results suggest a four-factor model that includes two primarily interpersonal factors, one reflecting general engagement, the second other-directedness. Other factors involved intellectual and self-control strengths. Implications for the understanding of character strengths in youth versus adults are discussed.

KEYWORDS

Adolescents; VIA Classification of Strengths and Virtues; factor analysis; VIA-Youth; measurement invariance

The nature of character has interested psychologists for almost a century (Hartshorne & May, 1928), with particular attention paid to the character of youth. Though Gordon Allport (1921) attempted to banish the concept of character from psychology, claiming it was more appropriate to the field of moral philosophy, his contemporary John Dewey seriously considered questions about the nature of character and virtue (Rice, 1996). However, it is only in the last 20 years that developmental and educational psychologists have created a body of literature on the nature and ontogeny of character (e.g., Damon, 1988; Lickona & Davidson, 2005; Narvaez, 2008). One factor that has hampered efforts to develop a comprehensive model of character development in youth is the lack of a coherent theory about the key elements and structure of character (Lapsley & Narvaez, 2006).

One of the most important recent contributions to the development of a structural model for character was the introduction of the VIA Classification of Strengths and Virtues by Peterson and Seligman (2004).[1] The Classification models the domain of positive personal characteristics in terms of 24 character strengths reflecting six more general cross-culturally valid virtues: Wisdom and Knowledge, Courage, Humanity, Justice, Temperance,

CONTACT Robert E. McGrath mcgrath@fdu.edu

Table 1. The VIA Classification of Strengths and Virtues.

Virtues	Character strengths
Wisdom and Knowledge	Creativity [originality, ingenuity]
	Curiosity [interest, novelty-seeking, openness to experience]
	Judgement & Open-Mindedness [critical thinking]
	Love of Learning
	Perspective [wisdom]
Courage	Bravery [valor]
	Perseverance [persistence, industriousness]
	Honesty [authenticity, integrity]
	Zest [vitality, enthusiasm, vigor, energy]
Humanity	Capacity to Love and Be Loved
	Kindness [generosity, nurturance, care, compassion, altruistic love, 'niceness']
	Social Intelligence [emotional intelligence, personal intelligence]
Justice	Teamwork [citizenship, social responsibility, loyalty]
	Fairness
	Leadership
Temperance	Forgiveness & Mercy
	Modesty & Humility
	Prudence
	Self-Regulation [self-control]
Transcendence	Appreciation of Beauty and Excellence [awe, wonder, elevation]
	Gratitude
	Hope [optimism, future-mindedness, future orientation]
	Humor [playfulness]
	Religiousness & Spirituality [faith, purpose]

Note: Terms in brackets are variants of the character strength according to Peterson and Seligman (2004).

and Transcendence (see Table 1). Character strengths are personal characteristics that have an admirable social quality, and are often morally valued. Virtues are more general principles of socially or morally desirable functioning as demonstrated by their common mention in works of moral philosophy and religion. Peterson and Seligman proposed that strengths and virtues should be hierarchically related, with strengths representing more personal instances of the virtues.

The strengths were identified through a three-year process involving input from more than 50 scholars and clinicians, extensive brainstorming, reviews of historical lists of virtues, and examination of popular literature and media (Niemiec, 2013). In contrast, the virtues were the product of a review of key moral texts from eight cultural traditions: Confucianism and Taoism in China; Buddhism and Hinduism in South Asia; and Athenian philosophy, Judaism, Christianity, and Islam in the West (Dahlsgaard, Peterson, & Seligman, 2005).

The model is therefore the product of what seems to be the most intensive effort to date to provide a comprehensive model of character strengths. However, the decision to use a structural model in which the levels represent the products of distinct development processes is an unusual one in psychology, and Peterson and Seligman (2004) considered the possibility that subsequent research would suggest modifications to the Classification. Several lines of research have addressed this issue. Ruch and Proyer (2015) recently attempted to corroborate the model as a conceptually derived framework. Specifically, a sample of experts in moral philosophy and psychology as well as laypersons evaluated the degree to which each of the 24 strengths was prototypical of each of the virtues. The results replicated the original model, with five exceptions. Humor was poorly related to Transcendence and associated more with Humanity. Four other strengths associated well with their proposed virtue but showed a stronger relationship to another: forgiveness, gratitude, and teamwork with Humanity; and

leadership with Courage. While the results are generally supportive of the VIA Classification, the method was more appropriate to evaluating how people think the strengths are related to the virtues than how they are actually related, and it assumed the six-virtue model as the best representation of the virtue space.

A more common approach to addressing the validity of the VIA Classification has involved the use of factor analysis or principal components analysis to generate a hierarchical structure (e.g., Brdar & Kashdan, 2010; Littman-Ovadia & Lavy, 2012; Macdonald, Bore, & Munro, 2008; McGrath, 2014; Peterson, Park, Pole, D'Andrea, & Seligman, 2008; Ruch et al., 2010; Shryack, Steger, Krueger, & Kallie, 2010; Singh & Choubisa, 2010). These efforts have largely relied on the VIA Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004), a 240-item questionnaire for adults 18 and over comprised of 10-item scales representing each of the strengths.

Though results have varied, several consistent conclusions emerged across these studies. First, the six-virtue model never replicated. Second, the resulting factors did not match any intuitive model of virtues. This second finding raised questions about whether in fact the latent structure underlying the strengths could be conceptualized in terms of broader conceptually relevant virtues.

McGrath (2015) raised another possibility, which is that the failure for the latent model to match cultural expectations had more to do with the standard practice in latent structural modeling of extracting the maximum number of reliable factors, and that findings for the VIA-IS scales to some extent reflected reliable sources of variability unique to the instrument. He addressed this hypothesis in two ways. First, he used Goldberg's (2006) 'bass-ackwards' approach to studying latent structures. This approach involves conducting a series of principal components analyses starting with the extraction of one component, then two, and continuing until some stopping point is reached. Solutions with more than one component are then typically rotated using the varimax method, because the use of orthogonal rotation means that the correlations between factor scores at level k and $k + 1$ can be interpreted as path coefficients. In the case of the VIA Classification, it particularly allowed for the evaluation of whether more intuitively compelling models emerged prior to the maximum solution. Second, McGrath extended the study to several alternate measures of the VIA Classification that might differ from the VIA-IS in terms of instrument-specific sources of covariation.

In each of four samples investigated, he found a consistent three-component model comprising strengths reflecting interpersonal issues, called Caring; intellectual exploration, called Inquisitiveness; and behavioral control, called Self-Control. It is interesting to note that certain strengths were consistently representative of each component in every sample, and these relationships replicated in two earlier articles on latent structure of the VIA-IS that found the same three-factor solution (Duan et al., 2012; Shryack et al., 2010). Greenberg, McGrath, and Hall-Simmonds (2016) have now identified exactly the same three factors across 12 samples of adults, and McGrath (2015) suggested these three dimensions as the basis for a model of virtue that is both conceptually and empirically defensible, and as the most useful structural model for the VIA Classification in adults. Strengths that have been consistently related to each factor can be found in Table 2.

An alternate measure of the VIA Classification has been developed for youth ages 10–17 called the VIA-Youth (Park & Peterson, 2006). An initial factor analysis of the VIA-Youth revealed four factors, which the authors called Temperance Strengths, Intellectual Strengths,

Table 2. The three-virtue model.

Virtues	Character strengths
Caring	Fairness
	Forgiveness & Mercy
	Gratitude
	Kindness
	Leadership
	Capacity to Love and Be Loved
	Teamwork
Inquisitiveness	Bravery
	Creativity
	Curiosity
	Love of Learning
	Perspective
	Social Intelligence
Self-Control	Honesty
	Judgement
	Perseverance
	Prudence
	Self-Regulation

Note: See Greenberg, McGrath, and Hall-Simmonds (2016).

Theological Strengths, and Other-Directed Strengths. The first two and last correspond well to the Self-Control, Inquisitiveness, and Humanity virtues described previously. However, subsequent studies have generally suggested a five-factor solution, comprised of the four factors identified by Park and Peterson (with Theological relabeled Transcendence Strengths) and an additional one variously called Leadership (Gillham et al., 2011; Ruch, Weber, Park, & and Peterson, 2014) or Vitality (Toner, Haslam, Robinson, & Williams, 2012) that has never emerged in factor analyses of adults.

These studies taken in combination with McGrath's (2015) study of adults raises three possibilities. One is that this 4–5 factor structure is inherent to the structure of the VIA strengths in youth within the age range that was evaluated. The second is that this structure is unique to the VIA-Youth, similar to the distinctive factor pattern for the VIA-IS in adults. The unique Leadership/Vitality factor also raises the possibility that the latent variables underlying character strengths in adolescents are developmentally different than those found in adults.

To evaluate this question, we conducted a study with two samples of teens that completed three different measures of the VIA Classification, one of which was quite different in format than the VIA-Youth. Our goal was to evaluate whether a reliable model for the structure of character strengths could be identified across measures and subsamples. To achieve this goal, in this study we: (1) develop a latent structural model for the VIA-Youth; (2) cross-validate that model in a second, larger, sample; and (3) demonstrate measurement invariance for that model across multiple potential moderators including age, gender, country of origin, and even measurement device.

Method

Participants

Sample 1. The first sample consisted of 23,850 individuals between the ages of 10 and 17 who completed all items of the VIA-Youth either through the Authentic Happiness website

(www.authentichappiness.sas.upenn.edu) between 2003 and 2012, or the VIA Institute website (www.viacharacter.org) between 2008 and 2013. The sample combines cases where various researchers from around the world used the website to collect data on the instrument, and cases where individuals accessed one of the sites on their own and completed the VIA-Youth in return for personalized feedback on their results. It includes the 131 teens who completed the VIA-Youth at the Authentic Happiness website and were used by Park and Peterson (2006) in their original evaluation of the instrument's factor structure. There was no mechanism by which to exclude those cases, but they represented a small minority of the total pool. No control was possible over people misrepresenting their age, though individuals generally approach the site for personal feedback on their test results, a goal likely to be undermined by completing the incorrect version.

Gender and country of residence data were not provided for cases from the Authentic Happiness website. Among those for whom gender was available, 55.8% of respondents were female and 44.2% male. Respondents were from 134 different countries, with the largest contingents coming from the US (49.1%), Australia (29.9%), the UK (5.5%), and Canada (5.2%). The mean age was 14.35 (SD = 1.92). Because of the worldwide scope of the sites, data on ethnicity were not collected.

Using a pseudo-random number generator, each member of the sample was assigned a value between 0 and 1. Those with a value ≤ .25 were assigned to the *development* subsample (N = 5947); the remaining cases were assigned to the *cross-validation* subsample (N = 17,903).

Sample 2. Data were collected from three English academy schools in 2014 as part of a wider research project called *Character Education in UK Schools* (Arthur, Kristjánsson, Walker, Sanderse, & Jones, 2015). The schools were located in the north and southwest and on the south coast of England. None of the schools were faith-based. Respondents included almost all students in Year 10, the penultimate year of secondary education, from each school. Questionnaires were checked for complete responses at the time of data collection. The sample consisted of 471 teens, of whom 44.8% were male and 55.2% female. Ages ranged from 13 to 15, with a mean of 14.48 (SD = .50). The sample was 90.5% white, with most of the rest either of Asian or mixed racial descent. When asked about religious affiliation, the most common response was Atheist (55.6%), followed by Christian (33.9%). A large majority of respondents (86.8%) indicated they did not practice any religion.

Measures

VIA-Youth. The VIA-Youth consists of 198 items that were developed and pilot-tested with age appropriateness in mind (Park & Peterson, 2006). Typical of self-report measures, the items reflect specific behaviors, attitudes, and self-perceptions considered reflective of the strength. Items are completed on a five-point scale from *very much like me* to *not like me at all*. Unlike the VIA-IS, where all items are positively keyed and each scale consists of 10 items, 55 of the VIA-Youth items are key-reversed, and the number of items per scale varies between 7 and 9. Though not studied as extensively as the VIA-IS, several studies have suggested good psychometric data for the VIA-Youth (Park & Peterson, 2006; Ruch et al., 2014). Coefficient alpha values for the 24 VIA-Youth scales varied between .70 and .91 in the present sample.

VIA-96. The VIA-96 is an abbreviated version of the VIA-Youth consisting of 96 items. Each scale is comprised of the four items from the VIA-Youth scale with the highest corrected item-total correlations based on Sample 1. Only five of the 55 reverse-keyed items met the criterion for inclusion. A subsequent sample of 253 teens who completed the VIA-Youth through the VIA Institute website was used to evaluate consistency between the two measures. Both the VIA-Youth and VIA-96 scores were computed from the VIA-Youth, and the mean correlation between original and revised strength scales was .82 (range = [.70, .92]). It should be noted, however, that computing the short form from the long form is considered inferior for evaluating convergence to having respondents complete the long and short forms of a measure on separate occasions (Smith, McCarthy, & Anderson, 2000).

Signature Strengths Survey. The Signature Strengths Survey (SSS) was developed to provide a very different measurement model for the strengths. The survey begins by providing a one-sentence description of each of the 24 strengths. On the next page, the respondent completes 24 items of the form '*x* is an essential part of who I am in this world,' with *x* changed to match each of the strengths. The next page presents 24 items of the form 'It is natural and effortless for me to express my *x* strength,' with *x* replaced in each case by one of the strengths. The last page contained 23 items of the form 'It is uplifting or energizing for me to express my *x* strength.' Unfortunately, due to a printing error, the final item having to do with Spirituality was omitted. These three concepts of *essential*, *natural and effortless*, and *uplifting or energizing* were derived from Peterson and Seligman's (2004) concept of the signature strength, strengths that a person tends to rely upon and consider a part of their identity. The SSS is distinct from the VIA-Youth and VIA-96 in that it involves global judgments of the strengths rather than responses to more specific items. All 71 items were completed on 7-point scale from *Completely true* to *Completely untrue*. Though scales consisted of only three items (and in the case of Spirituality, two), coefficient alpha varied between .71 and .90 across the 24 scales, with a mean of .80. Given the sensitivity of Cronbach's alpha to the number of items (Schmitt, 1996), this finding indicates substantial convergence among the global items.

Procedure

As noted above, Sample 1 completed the VIA-Youth either through the Authentic Happiness or VIA Institute websites. Neither website actively recruits visitors. However, the sites are commonly mentioned in discussions of positive psychology written for the general public, and researchers often direct people to the VIA website for purposes of data collection.

Sample 2 completed the VIA-96 online in a survey administered in the three schools by the Jubilee Centre for Character and Virtue at the University of Birmingham. One year later, a subsample of Sample 2 (N = 418), now in Year 11, completed the SSS in a paper-and-pencil form. All scores were generated by averaging across items.

Results

Derivation subsample analyses

Fixing the number of factors. We first used the derivation subsample from Sample 1 to generate an initial latent variable model of strengths in adolescents. Two methods were used to

determine the number of reliable factors, called parallel analysis and the minimum average partial procedure (Hayton, Allen, & Scarpello, 2004; Velicer, Eaton, & Fava, 2000). Parallel analysis involved creating 100 data matrices with the same number of variables and cases as the raw data matrix but comprised of randomly generated data. The true data matrix and each of the random data matrices was then submitted to principal components analysis without rotation. The eigenvalue for the *k*th component from the derivation subsample was compared to the eigenvalues for the *k*th component from the 100 principal components analyses of random data; retention stopped when this comparison suggested the remaining factors reflect chance covariation. When parallel analysis was originally developed, it was suggested that retention should stop at that component where the mean eigenvalue for the 100 random data sets exceeded the corresponding eigenvalue from the true data set. More recent practice has leaned towards retaining components only so long as the true eigenvalue exceeds the 95th percentile value in the random matrices (Glorfeld, 1995).

The minimum average partial procedure involved sequentially partialing each principal components analysis component from the data correlation matrix, computing the squared partial correlations between each pair of variables using the residual values, and computing the mean value for the resulting squared partial correlations. Partialing a true component reduces common variance, so if the component that was partialed is a true, reliable component, then the resulting squared partial correlations should be smaller after partialing than they were before, and the mean squared partial correlation should shrink. Partialing an unreliable component would remove unique variance, so the mean of the partial correlations should increase. Extraction stops when the mean squared partial correlation reaches a local minimum, that is, when further extraction causes the squared partial correlation to increase. Velicer et al. (2000) concluded the procedure's accuracy could be improved by raising the average partial correlation to the fourth rather than the second power.

We conducted both analyses using SPSS macros developed by O'connor (2000). O'Connor's minimum average partial macro provides estimates of the number of factors after both squaring the mean partial correlation and after raising it to the fourth power, while his parallel analysis macro allows comparison of the true data eigenvalues to both the mean and 95th percentile value for the random data eigenvalues. That meant there were four tests available of the number of components across the two procedures. All four supported retaining four factors, consistent with Park and Peterson's (2006) original conclusion, so all analyses focused on four-factor models.

Model development. Subsequent analyses used Mplus version 7.4 (Muthén & Muthén, 2015) to conduct exploratory structural equation modeling (ESEM; Asparouhov & Muthén, 2009). ESEM is a procedure that marries elements of exploratory and confirmatory factor analysis. Like exploratory factor analysis, ESEM allows estimation of all relationships between latent factors and observed variables. Like confirmatory factor analysis, ESEM allows for the computation of statistics evaluating goodness of fit for the model. Default Mplus settings were used for both estimation (maximum likelihood) and rotation (geomin oblique).

Seven indices were used to evaluate the ESEM models that were generated. The root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis index (TLI) are dimensional indicators of model goodness of fit constrained to the range [0, 1]. The first two involve a comparison of the covariances between the observed variables in the data set to a set of estimates of those

covariances generated from the structural equation model. The smaller the differences between these two covariance matrices, the better the fit. The RMSEA indicates how well the model estimates the best estimate of the population covariance matrix. Values of .07 or less are considered evidence of a well-fitting model (Steiger, 2007). The RMSEA is particularly popular because it allows for the computation of a confidence interval, and it is smaller for more parsimonious models. The SRMR evaluates the degree of discrepancy between model-based estimates of covariances and the actual sample covariances, with values of .08 or less considered desirable (Hu & Bentler, 1999). The CFI and TLI instead evaluate the degree to which the estimated model is superior to a model in which all measured variables are assumed to be uncorrelated. Values of .95 or greater are considered desirable for both (Hu & Bentler, 1999).

In addition to fit indices, Mplus provides three indicators of fit relative to the parsimony of the model: the Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-adjusted BIC. These information statistics are unconstrained in value, so cannot be interpreted individually. Instead, values for different models can be compared, with smaller values indicating better fit.

The first row of statistics in Table 3 are from the ESEM in the derivation subsample with all error covariances between observed scales constrained to equal zero; that is, all covariation between strengths was accounted for in this model by relationships with factors, and correlations between the factors. All fit indices approached desirable values, but only SRMR fell within the range indicating acceptable fit.

Table 3. Fit indices and information statistics.

	Fit indices				Information statistics		
	RMSEA	CFI	TLI	SRMR	AIC	BIC	Adj BIC
Derivation 1	.084 [.082, .085]	.909	.865	.031	238830.818	239754.127	239315.602
Derivation 2	.052 [.051, .054]	.971	.947	.018	233576.550	234747.413	234191.312
Cross-Valid	.055 [.054, .056]	.968	.941	.019	701107.849	702471.575	701915.435
Age							
Configural	.055 [.054, .056]	.968	.941	.020	697759.832	708669.645	704220.526
Metric	.047 [.046, .048]	.966	.957	.030	697809.013	704354.901	701685.430
Scalar	.051 [.050, .051]	.958	.950	.035	699789.221	705244.127	703019.568
Gender							
Configural	.057 [.055, .058]	.966	.937	.020	367585.872	370091.059	368978.814
Metric	.052 [.051, .053]	.964	.947	.026	367775.707	369708.280	368850.262
Scalar	.057 [.056, .059]	.953	.935	.034	369152.654	370942.074	370147.613
Country							
Configural	.056 [.055, .058]	.966	.938	.020	368772.122	371277.309	370165.064
Metric	.051 [.050, .053]	.965	.949	.026	368908.284	370840.857	369982.840
Scalar	.056 [.055, .057]	.956	.939	.029	370082.668	371872.087	371077.626
VIA-96							
Configural	.055 [.054, .056]	.968	.940	.019	725155.984	727892.526	726780.245
Metric	.050 [.049, .051]	.966	.951	.023	725412.062	727523.109	726665.064
Scalar	.051 [.050, .051]	.964	.950	.025	726013.877	727968.550	727174.063
SSS							
Configural	.056 [.055, .057]	.968	.940	.019	725765.815	728501.346	727389.065
Metric	.051 [.050, .051]	.966	.950	.022	726105.777	728216.044	727357.999
Scalar	.053 [.052, .053]	.961	.946	.030	727302.734	729256.685	728462.199

Note: RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square residual; AIC = Akaike information criterion; BIC = Bayesian information criterion; Adj BIC = sample-adjusted BIC; Cross-Valid = cross-validation sample; SSS = Signature Strengths Survey. Values in brackets reflect the 90% confidence interval for the RMSEA.

We evaluated several different approaches to modifying the model with the goal of achieving good fit, including use of bifactor and second-order models (Chen, West, & Sousa, 2006). We ultimately settled on allowing 37 covariances between error terms with modification index values > 100 to vary freely. The resulting model approached or exceeded the benchmarks listed above for the four fit indices. The results for this modified model may be found in the second row of statistics in Table 3. With the exception of a TLI value slightly below the benchmark, all fit indices met criteria for an acceptable model, and all three information statistics indicated improvement. This model was used for all subsequent analyses. The Appendix lists the 37 error terms allowed to covary.

Measurement invariance across demographic variables

Preliminary issues. The next step in the analysis involved evaluating the fit of the final model in the cross-validation subsample, to evaluate the model's reliability. Results are presented in the next row in Table 3. Values for the fit indices are only slightly poorer than those found for the derivation sample: the largest difference is .006, though the information statistics are substantially higher as a result of the much larger sample size. The results suggest the modified four-factor model provided a good fit to the cross-validation subsample. This subsample was used in all subsequent analyses.

These analyses focused on the evaluation of three levels of measurement invariance (Bontempo & Hofer, 2007) across demographic subgroups and measurement instruments. The first level assumed configural invariance, which is the most basic condition needed for assuming conclusions drawn with one subgroup are meaningful for another subgroup. Configural invariance occurs when the set of loadings to be estimated is the same in each subgroup, but they are estimated separately in each. In the case of ESEM, this meant that each of the four factors was allowed to load on each of the 24 strengths in each subgroup. However, loading values could vary across subgroups. In addition, the intercepts for the equations that result from regressing the observed variable on the factors are allowed to vary across groups.

The second level tested for metric invariance, in which factor loadings are assumed to be invariant across groups. Metric invariance is considered the necessary minimum condition for concluding that items are being interpreted equivalently across groups, because it suggests the relationship between the factor and the observed variable is equivalent. The third model tested for scalar invariance, which requires equivalence in both the factor loadings and intercepts. Scalar invariance, which is considered evidence of strong measurement invariance, suggests that values on the manifest variables can be directly compared across groups: differences between scores from two groups mean the same thing as differences between scores involving two members of the same group. Cheung and Rensvold (2002) concluded that changes in the CFI value of < .01 from one level to the next are desirable, suggesting the more rigorous invariance constraints have not substantially reduced model fit.

Measurement invariance and age. We first evaluated measurement invariance of the four-factor model across eight age groups (ages 10–17) in the cross-validation subsample. Group sizes varied between 677 (10-year-olds) and 3476 (14-year-olds). Goodness of fit for the configural model was almost exactly the same as that for the cross-validation subsample as a whole. In fact, none of the fit indices differed by more than .001 from those for the entire cross-validation sample. Findings also supported metric invariance in this analysis. RMSEA

and TLI values actually improved, as did the BIC and sample-adjusted BIC. Deterioration of the CFI and SRMR was slight, and for CFI < .01. The increase in the AIC relative to total value was similarly minimal. Scalar invariance statistics were consistently poorer than those for the metric analysis, but all remained in the acceptable range, CFI was just .01 below that for 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 ages with little impact on model fit suggests VIA-Youth results can reasonably be interpreted as equivalent in meaning across ages 10 to 17.

Gender and country. The next two sets of analyses examined measurement invariance across females ($N = 5330$) versus males ($N = 4157$) and across countries of residence within the cross-validation sample. Because no other nation was as widely represented as the US, the sample was divided into two groups representing the US ($N = 4655$) and all other countries of residence ($N = 4832$). In both cases, the pattern described for age was essentially replicated with small variations, though the deterioration in fit indices was slightly larger. For example, the CFI for gender invariance declined by .013 when comparing configural and scalar models. All fit indices remained in the acceptable range. In no cases did the result demonstrate a substantial decline in fit when the invariance constraints were tightened.

Measurement invariance across measures

The VIA-Youth data from the cross-validation subsample were combined with the VIA-96 and SSS data from Sample 2 for purposes of evaluating invariance across measurement instruments. The pattern noted so far again replicated for the VIA-96. Fit indices for the configural model were consistent with those from the cross-validation subsample alone, and the TLI actually increased when factor loadings were set to be equal. CFI showed almost no change across the three models. Support for invariance could be expected in this case, however, since the VIA-96 items are a subset of those comprising the VIA-Youth.

What was less expected was its replication in the comparison between the VIA-Youth and the SSS. The two employ very different self-report measurement models. A particularly important issue is that, because of the number of response alternatives per item, the possible range of values on the VIA-Youth and VIA-96 was [1, 5], while the range for the SSS was [1, 7]. The intercepts therefore should differ, so that metric rather than scalar invariance is the highest level that would reasonably be expected. Despite these differences, the assumption of scalar invariance resulted in relatively small and essentially trivial deterioration in fit across all indices. That is, the pattern replicated was the same found in the previous invariance analyses despite potentially greater disparities in the data.

Parametric estimates

Factor structure. Table 4 provides the pattern matrix and factor correlations from the derivation subsample. The first factor is an interesting admixture of scales. Among the strongest loadings are those for scales consistent with the concept of Transcendence that has emerged in previous factor analyses of the VIA model in teens: spirituality, love, and gratitude. There is another set of scales having to do with social engagement—humor, leadership, bravery, perspective, and social intelligence—that all demonstrate their strongest relationship with

Table 4. Factor loadings and correlations from the derivation subsample.

Strength	Vitality	Self-Control	Inquisitiveness	Other-Directed
Beauty	.008	−.028	**.490**	.225
Bravery	**.261**	.044	.199	.092
Creativity	.034	−.005	**.582**	−.077
Curiosity	.027	−.014	**.492**	−.004
Fairness	.116	**.278**	.075	.247
Forgiveness	.235	.062	−.011	**.353**
Gratitude	**.482**	.109	−.037	.059
Honesty	.202	**.385**	−.020	.070
Hope	**.537**	.158	.004	−.163
Humor	**.542**	**−.335**	.092	.012
Judgment	.009	**.403**	.235	.031
Kindness	**.308**	−.003	.069	**.291**
Leadership	**.450**	.085	.125	−.184
Learning	.005	.157	**.435**	.018
Love	**.614**	−.054	−.174	.014
Modesty	−.028	.248	.002	**.338**
Perseverance	**.267**	**.435**	.048	−.164
Perspective	**.317**	.128	.158	.003
Prudence	−.003	**.619**	.012	−.059
Self-Regulation	.020	**.505**	−.011	.072
Social Intelligence	**.331**	.189	.006	.062
Spirituality	**.582**	.019	−.167	−.032
Teamwork	**.318**	.149	−.004	.190
Zest	**.655**	−.087	.005	−.124
Correlations				
Vitality		.559	.627	.209
Self-Control			.366	.312
Inquisitiveness				.145

Note: Loadings in bold are > .25.

this factor. Finally, the largest single loading is associated with zest, and hope is also associated with this factor.

The second and third factors are more straightforward. The second is most strongly related to those strengths reflecting behavioral control: prudence, honesty, perseverance, judgment, and self-regulation. The third is characterized by intellectual strengths: appreciation of beauty, creativity, curiosity, and love of learning.

The final factor is marked by strengths that have been identified as an interpersonal factor in prior studies with adolescents: forgiveness, kindness, and modesty. This last factor clusters together those strengths in the VIA Classification that are most reflective of concern for and thoughtfulness about others over self.

These factors bear comparison with the factor analyses of adolescents and adults reviewed previously. The first factor strongly mirrors the Theological Strengths factor described by Park and Peterson (2006), who also found a four-factor solution. However, that name does not effectively capture many of the scales associated with this factor, which in subsequent studies formed a separate factor called Leadership or Vitality (Gillham et al., 2011; Ruch et al., 2014; Toner et al., 2012). Given the large loading for zest, we elected to use this last label, with the understanding that the first factor seems to reflect a general sense of engagement in the youth.

The other three factors replicate the intellectual, temperance, and interpersonal factors reported in all previous factor analyses with youth. The second and third are also respectively consistent with the Inquisitiveness and Self-Control factors reported in adults (McGrath, 2015). However, the Caring factor found in adults decomposed in the present samples into two components. Some of the common markers of Caring in adults, such as love

and gratitude, in teens may better be understood as part of a general sense of emotional engagement. The fourth factor grouped together those strengths having to do with the more mature capacity to put others ahead of self, so we labeled it Other-Directed.

In summary, these results are fully consistent with previous factor analyses involving the VIA-Youth, though some studies found the factor we call Vitality decomposing into two components. It also provides a partial replication of the three-factor model for adults described by McGrath (2015). The differences from the adult model offer an interesting perspective on the nature of adolescents' interpersonal commitments as compared to those of adults.

Factor congruence. One objection that could be raised to the use of ESEM in the context of measurement invariance is that the different analyses could have produced very different factor models, and as long as they encompassed four factors and were consistent in fit could have produced the statistics reviewed so far. For example, it is possible for the cross-validation subsample to have demonstrated similar goodness of fit even with substantial changes in the loadings, and therefore, in the interpretation of the four factors. The next set of analyses evaluated the degree to which loadings in subsequent analyses were consistent with those reported in Table 4.

Tucker congruence coefficients were computed comparing the factor loadings from the derivation subsample to the loadings generated by the ESEM of the cross-validation subsample. For each factor in the derivation subsample there was one factor from the cross-validation subsample where the Tucker coefficient exceeded .98, suggesting near-perfect convergence.

Congruence analyses were repeated comparing loadings for the derivation subsample to the scalar model loadings from the comparisons across ages, genders, and countries, and between the VIA-Youth and the VIA-96. In some cases, the order of factors changed; for example, the first factor from the derivation subsample demonstrated congruence with the third scalar-invariant factor from the analyses based on age. However, in every case it was possible to find one factor in subsequent analyses that was congruent with each factor in the derivation subsample. Across 16 comparisons of loadings from congruent factors (four derivation subsample factors compared to factors from the age, gender, country, and VIA-96 analyses), there were only three congruence coefficients below .95, and all were above .90. Again, the results suggest excellent convergence across these models.

Finally, the analysis was repeated comparing the loadings from the derivation subsample to those from the comparison between the VIA-Youth and SSS. As noted previously, scalar invariance is not a reasonable expectation between two measures that use different item scales. When comparing the derivation sample loadings to the more appropriate metric-invariant loadings for the VIA-Youth and SSS, Tucker congruence coefficients ranged between .94 and 1.00. Taken together, these results indicate the four factors that emerged in the derivation subsample and that are described in Table 4 emerged in essentially the same form in every subsequent analysis.

Discussion

Key findings

This study is the largest to date examining the factor structure of the VIA Classification in teens, and the first to evaluate measurement invariance and multiple measurement methods.

Major findings included the following. First, the latent structure of the VIA-Youth was adequately represented by a four-factor model that is consistent with or very similar to results from prior factor analyses of the VIA-Youth, as well as with factor analyses of adults. It includes factors representing intellectual and behavioral control strengths, which have emerged previously in all age groups studied. Where the most reliable model in adults suggests a third factor that encompasses interpersonal concerns, that factor seems to decompose into two factors representing engagement in the world (called Vitality here) versus concern for others over self (called Other-Directed). The Transcendence factor that has emerged in prior factor analyses of the VIA-Youth was embedded in the Vitality factor.

The second important finding was evidence of scalar invariance across all analyses. The conclusion that age was not an important moderator of either pattern matrix loadings or intercepts was particularly important, indicating that the meaning of scores across age groups is consistent, and it is meaningful to compare scores on the VIA-Youth from youth between ages 10 and 17. Considering the broad age range of the test, including pre-pubescent children, this is a valuable finding that supports use of the VIA-Youth across its entire intended age range.

Invariance and factor congruence was demonstrated even in the comparison of the VIA-Youth with other measurement instruments. These findings support the conclusion that the four-factor model described here is relevant to the VIA Classification model in general among youth, regardless of measurement method, and is not just an attribute of the VIA-Youth.

Implications

The three factors of Caring, Inquisitiveness, and Self-Control found in adults are clearly consistent with philosophical conceptions of virtue (McGrath, 2015). The current findings support the conclusion that the division of strengths into those that primarily represent interpersonal, intellectual, and intrapersonal functioning is meaningful for youth as well, though how they conceptualize the interpersonal domain may be different than is true for adults. These findings may also have implications for character education programs. First, they suggest the development of interpersonal, intellectual, and intrapersonal strengths may be the most important goals for such programs (see also Greenberg et al., 2016; Park, Tsukayama, Goodwin, Patrick, & Duckworth, 2016). Second, they suggest a comprehensive understanding of adolescent character might include evaluating a student's level of interpersonal engagement separately from their capacity to place the interests of others ahead of their own.

The decomposition of the reliable three-factor adult model into a four-factor model in youth offers an interesting parallel with research on the structure of global personality in children and adolescents. Where adult personality is most reliably captured by the traditional Big 5 (Emotional Stability or Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Intellect or Openness), extensive research with children and adolescents suggest a sixth factor called Activity (Soto & Tackett, 2015). Activity is primarily marked in youth by indicators of motivation and competitive drive, which is consistent with the role that leadership and zest play in the Vitality factor. Taken together, these two lines of research converge on the proposition that personality traits in youth and adults are structurally different than they are in adults, with youth traits to some extent organized

around a generalized energy that fades over time so that the adult perspective on character can emerge. This conclusion is also consistent with the role of Activity in Chess and Thomas (1996) seminal theory of temperament. The relative weakness of the factor representing other-directedness may also reflect deficiencies in the evolving capacity for empathy in teens (Allemand, Steiger, & Fend, 2015).

The Vitality factor raises some intriguing questions about how youth experience character strengths in contrast to adults. It suggests that in adolescence the demonstration of loving feelings or capacity for leadership are more an outgrowth of general zestfulness or emotional engagement. With adulthood, as activity level tapers off, a more cognitively based understanding emerges in which concepts such as gratitude and love become entwined with more temperate strengths such as modesty and forgiveness. If subsequent research were to support this hypothesis, it would suggest that even among youth who demonstrate strong feelings of love or potential for leadership, there is still a good deal to learn about understanding these concepts from a communal perspective.

Limitations

Despite its size and breadth of focus, the study demonstrates several weaknesses. Perhaps the most significant is the use of modification indices to achieve acceptable fit, which is a topic of some concern in the literature on latent trait modeling (e.g., MacCallum, Roznowski, & Necowitz, 1992). We justify our decision in several ways. First, given that all strategies used for setting the number of factors indicated there were four, all prior factor analyses for the VIA-Youth had indicated four to five factors, and the relatively weak loadings associated with the fourth factor in the derivation sample suggests that additional factors would contribute little to the model, we believed a four-factor solution was optimal for these data. We would argue that the failure of the original model to achieve good fit is a function of substantial correlation between elements of positive functioning, so that even permitting loading of each strength on each factor via ESEM as well as factor inter-correlations could not adequately account for a sufficient proportion of the observed covariation between strengths. For example, more than 10% of correlations between strengths in the derivation sample exceeded .60. In fact, common strategies used to improve fit that involve eliminating factor correlations, such as bifactor and second-order models, actually reduced fit. Even with a fair amount of model modification, though, the very large sample sizes increased the likelihood that the modified model is valid. The evidence for good fit in the cross-validation sample, measurement invariance across all demographic variables, and even measurement invariance across questionnaires all support this hypothesis.

The study has several other noteworthy limitations. It is based exclusively on the VIA model, which is not the only available model for character (e.g., Benson, Scales, & Mannes, 2003). Realistically, it would never be possible to identify a single model that would fit all measurement devices, since structure is a function of the mix of item targets in the instrument. For example, a recent study developed a measure called the Assessment of Character in Children and Early Adolescents with the intention of measuring eight positive attributes emphasized by the Boy Scouts of America: obedience, religious reverence, cheerfulness, kindness, thriftiness, hopeful future expectation, trustworthiness, and helpfulness (Wang et al., 2015). The authors found an eight-factor model best fit the data. This level of complexity was reasonable, however, because the authors specifically chose approximately equal

numbers of items representing each of these dimensions. While the present results are specific to the VIA model, and alternative models are possible that could lead to very different conclusions about the structure of good character, it is worth noting that the VIA model is distinctive from most others in that it attempts to provide an objectively derived, comprehensive perspective on what comprises good character, with input from numerous experts in the field of character development and positive functioning (Peterson & Seligman, 2004).

Of course, all measures used in this study were self-report, and may not represent the structure of youth character as perceived by significant informants such as teachers and parents. Finally, the age cohorts involved different individuals. Future research with longitudinal data could provide a clearer sense of variations in character self-reports over time, though presumably within-person data should increase the likelihood of demonstrating measurement invariance across age groups even further. Such research could also further inform the understanding of how the four-factor model evolves into the three factors found in adults.

With these caveats in mind, the present results can be taken as suggesting several interesting conclusions. First, the VIA Classification can be effectively understood as the product of four underlying factors among youth ages 10 to 17, reflecting interpersonal, intellectual, and self-controlled domains of functioning. Second, the interpersonal character of the adolescent may be distinct from that of adults, in that it potentially encompasses a general energized sense of engagement as well as more other-directed elements that presumably set the stage for the emergence of adult empathy. The model is stable across key demographic variables including age and nation of residence that would intuitively moderate the structure of character (though the non-US sample still had access to the Internet, and largely consisted of residents from Western nations, so may not be generalizable to more traditional cultures). Finally, these four factors appear relevant to the VIA Classification rather than to any specific measurement device. Given the Classification is particularly intended to be comprehensive in scope, the results may indicate something relevant to the emergence of character in general in youth.

Note

1. VIA originally stood for Values in Action but is now an orphaned acronym.

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Notes on contributor

Robert E. McGrath is Professor of Psychology at Fairleigh Dickinson University, and Senior Scientist for the VIA Institute on Character. His current research focuses on the measurement, structure, and development of character and virtues. He has authored over 200 books, chapters, presentations, and articles. He is a Fellow of the American Psychological Association, Association for Psychological Science, and Society for Personality Assessment. In 2017 he also becomes a member of the Board of Directors of the American Psychological Association.

David Walker is Research Fellow in the Jubilee Centre for Character and Virtues at the University of Birmingham, UK. He has published in the areas of identity, character, families and education using both quantitative and qualitative methods in equal measure. Although much of David's work has been in the context of military communities in UK and USA, his general aim to improve well-being among individuals and families coping with challenging events extended to UK schools as Principal Investigator of a large study about how the 'whole child' is being developed there. Currently, David is Principal Investigator of a study about character among junior British Army officers, including the development of a measure of ethical reasoning. David is co-editing a collection of papers for the forthcoming book, *The Theory and Practice of Virtue Education* by Routledge, and will take up a new position as Senior Research Fellow in Integrated Health at Northumbria University in January 2017.

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Appendix

Error covariances were allowed to vary freely for the following pairs of scales:

- Perspective with Leadership
- Learning with Curiosity
- Social Intelligence with Perspective
- Leadership with Gratitude
- Zest with Perspective
- Hope with Gratitude
- Perspective with Learning
- Gratitude with Love
- Learning with Love
- Perspective with Gratitude
- Perspective with Judgment
- Kindness with Hope
- Learning with Humor
- Leadership with Bravery
- Spirituality with Gratitude
- Social Intelligence with Humor
- Spirituality with Humor
- Judgment with Prudence
- Social Intelligence with Prudence
- Kindness with Bravery
- Teamwork with Prudence
- Perseverance with Honesty
- Social Intelligence with Perseverance
- Perspective with Bravery
- Honesty with Bravery
- Spirituality with Beauty
- Perspective with Humor
- Leadership with Hope
- Spirituality with Hope
- Forgiveness with Love
- Kindness with Love
- Social Intelligence with Learning
- Spirituality with Social Intelligence
- Gratitude with Curiosity
- Leadership with Love
- Leadership with Teamwork
- Modesty with Prudence