The structure of virtue: An empirical investigation of the dimensionality of the virtues in action inventory of strengths

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ABSTRACT

Research on virtues and character strengths has increased over the past decade. The virtues in action classification (VIA; Peterson & Seligman, 2004) is a comprehensive catalogue of 24 strengths organized under six broad-band virtues purported to be ubiquitous across time and culture. This study uses multiple criteria to determine the dimensionality of the VIA character strengths in an adult sample. Our results revealed that a three- or four-dimensional model best fit the data. We integrate our results with research from personality and positive psychology.

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1. Introduction

Virtue has recently been defined as "any psychological process that enables a person to think and act so as to benefit him- or herself and society" (McCullough & Snyder, 2000, p. 1). As such, virtue-related concepts historically have been of considerable interest to psychological researchers and practitioners, as exemplified in the humanistic psychology tradition (Peterson & Seligman, 2004) and in family social science research on family strengths and resilience (Sandage & Hill, 2001). The past decade has seen a burgeoning research literature develop on character strengths and virtues, for example in personality psychology (e.g., Krueger, Hicks, & McGue, 2001), moral development (e.g., Walker & Pitts, 1998), positive youth development (e.g., Rich, 2003) and educational psychology (e.g., Narvaez & Lapsley, 2005). Empirical studies of virtue have used various analytic approaches to capture the implicit, folk psychological understanding as well as the self-reported features and hierarchical dimensions of moral personality, ranging from use of the lexical method (Cawley, Martin, & Johnson, 2000) to similarity sorting and protoypicality ratings (Haslam, Bain, & Neal, 2004; Walker & Pitts, 1998). Beyond content and structure, a number of practical applications for this work have been suggested, for exam-ple in education (Park, Peterson, & Seligman, 2006; Steen, Kacho-rek, & Peterson, 2003), clinical settings (Seligman & Peterson, 2003; Seligman, Steen, Park, & Peterson, 2005), and organizations (Peterson & Park, 2006).

Perhaps the most systematic approach to studying virtue and character strengths from a psychological perspective has come from the field of positive psychology. The model proposed by Peterson and Seligman (2004) – called herein the virtues in action (VIA) model (Peterson & Seligman, 2004) – is a putatively comprehensive classification initially created to balance a so-called pathology focus in psychology with a focus on human flourishing (Seligman & Csikszentmihalyi, 2000) (Note: The model has recently been renamed simply VIA, although the original model was called "virtues in action" and was referred to as such in numerous previous publications.). *Virtues*, as described in the VIA model, are assumed to be broad-band, socially desirable, individual difference constructs that are valued across cultures, and include wisdom, courage, humanity, justice, temperance and transcendence. These relatively abstract virtues are differentiated from *character strengths*, which are the observable traits manifest in cross-situationally consistent behavior (see Table 1).

The original VIA classification was driven by both a comprehensive literature review and professional consensus (Dahlsgaard, Peterson, & Seligman, 2005; Peterson & Seligman, 2004), as opposed to factor analysis. Seligman and Peterson (2003) noted that their classification is "a very tentative enumeration" (p. 309) and later suggested it will change "by reformulating [the

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Table 1
Means and standard deviations for 24 character strengths.

Virtue	Strength	M	SD
Wisdom (cognitive strengths of acquiring and using knowledge)			
	Creativity (thinking of novel means and concepts)	2.63	.706
	Curiosity (interest in things, exploring)	2.23	.577
	Perspective (understanding world, wise counsel)	2.43	.520
	Judgment (weighing all evidence fairly)	2.31	.524
	Love of learning (systematically add knowledge)	2.77	.707
Courage (emotional strengths, exercise will to accomplish goals)			
	Perseverance (completing tasks one starts)	2.28	.545
	Bravery (not shrinking from threat or difficulty)	2.52	.576
	Honesty (presenting oneself in a genuine way)	2.04	.424
	Zest (feeling alive and excited)	2.38	.599
Humanity (interpersonal strengths, cultivating relationships)			
	Social intelligence (understanding social world)	2.45	.539
	Kindness (helping and taking care of others)	2.05	.521
	Love (valuing close relationships)	2.17	.541
Justice (civic strengths underlying healthy community life)			
	Leadership (organizing group activity)	2.37	.520
	Fairness (treating everyone fairly and justly)	2.05	.468
	Teamwork (being a good team member)	2.34	.497
Temperance (strengths protecting against excesses)			
	Forgiveness (forgiving others)	2.32	.534
	Self-regulation (regulating feelings and actions)	2.66	.568
	Prudence (choosing actions with care)	2.41	.467
	Modesty (not overvaluing self)	2.41	.488
Transcendence (strengths providing meaning, links with universe)			
	Spirituality (beliefs about purpose and meaning)	2.29	.780
	Appreciation of beauty (awareness of excellence)	2.58	.676
	Hope (expecting/working toward good future)	2.35	.546
	Gratitude (thankfulness for good things)	2.05	.531
	Humor (seeing light side of life, liking to laugh)	2.22	.592

Note: VIA-IS labels and descriptions were originally adapted by Steger et al. (2007) from Peterson and Seligman (2004).

Table 2
Number and labels of virtue dimensions from selected publications.

Authors and date	Instrument	Extraction method	Retained dimensions	Labeled dimensions
Cawley et al. (2000)	Virtues scale	Factor analysis	4	Empathy, order, resourcefulness, serenity
Dahlsgaard (2005)	VIA-Y	Components analysis	4	Temperance, intellect, transcendence, gregariousness
Park and Peterson (2005)	VIA-Youth	Components analysis	4	Conscientiousness, openness, agreeableness, theological strengths
Park and Peterson (2006)	VIA-Youth	Factor analysis	4	Temperance strengths, other-directed strengths, intellectual strengths, theological strengths
Peterson and Park (2004)	VIA-IS	Factor analysis	5	Conative strengths, emotional strengths, cognitive strengths, interpersonal strengths, transcendence strengths
Peterson and Seligman (2004)	VIA-IS	Factor analysis	5	Restraint strengths, interpersonal strengths, intellectual strengths, emotional strengths, theological strengths
Peterson et al. (2008)	VIA-IS	Components analysis	5	Interpersonal, fortitude cognitive, temperance, transcendence
Van Eeden, Wissing, Dreyer, Park, and Peterson (2008)	VIA-Youth	Components analysis	1	Unidimensional virtue factor

Note: all data were collected with adult samples except Dahlsgaard (2005), Peterson and Park (2006) and Van Eeden et al. (2008). Oblique rotations (versus orthogonal rotations) were used by Park and Peterson (2006) and Van Eeden et al. (2008).

strengths'] organization under core virtues" (Peterson & Seligman, 2004, p. 31). Indeed, when the virtues in action assessment tool, the VIA-IS, has been subjected to empirical analysis, Peterson and Park (2004), Peterson and Seligman (2004) and Peterson, Park, Pole, D'Andrea, and Seligman (2008) have found only moderate support for the conceptual structure. Specifically, support for a five- rather than six-factor model has been found (see Table 2).[1]

In studies with youth, results converged on a four-factor model (Dahlsgaard, 2005; Park & Peterson, 2006; Peterson & Park, 2004; Peterson & Seligman, 2004).

How does virtue content in the reduced models specifically compare to virtue content in the theoretical classification? Much VIA research suggests that strengths from two theoretically distinct virtues – justice and humanity (see Table 1) – collapse into a single factor in both youth (Park & Peterson, 2005; Peterson & Seligman, 2004) and adult samples (e.g., Peterson, Park, Pole, D'Andrea, & Seligman, 2008; Peterson & Seligman, 2004). These findings are important because the juxtaposition of these theoret-

[1] Park and Peterson (2005), Peterson and Seligman (2004) and Peterson and Park (2004) provided synopses of their analyses including labeled dimensions, but did not list factor loadings in these reports.

ically distinct virtues has constituted a fundamental debate in the field of moral development, often in the context of gender differences (Haidt, 2008). In addition, Dahlsgaard (2005) and Park and Peterson (2006) were unable to find evidence for a courage factor in youth samples. Other researchers have found mixed support for the existence of the four remaining virtues. Some studies (e.g., Dahlsgaard, 2005; Park & Peterson, 2006; Peterson, Park, Pole, D'Andrea, & Seligman, 2008) have suggested a clear wisdom or intellect factor, while others have not (e.g., Cawley et al., 2000). One factor that has tended to replicate across most studies is Temperance, loading such strengths as perseverance, prudence, and self-regulation (e.g., Park & Peterson, 2005, 2006; Peterson & Park, 2004).

Finally, most of the factor analyses cited above have only or primarily used the eigenvalues-greater-than-one ($K > 1$) rule to make decisions about VIA dimensionality. This study aims to extend previous studies of the VIA model by using multiple criteria for determining structure.

One of the best ways to evaluate data dimensionality is replication of a specified structure in a new sample using exploratory factor analysis (Comrey, 1988; Gorsuch, 2003). In that spirit, this study was designed to answer the following question: how many virtue dimensions emerge when the VIA-IS is administered in a new sample using multiple methods to ascertain component or factor retention? We hypothesized that between four and five factors would represent an upper limit for retained dimensions. Further, we hypothesized that, at a minimum, the retained dimensions would include one which loads both humanity and justice strengths, an intellect dimension including at minimum curiosity and love of learning, and a temperance dimension loading the strengths of perseverance, self-regulation and prudence as reported in previous VIA research (Park & Peterson, 2005, 2006; Peterson & Park, 2004).

2. Method

2.1. Participants

Monozygotic and dizygotic male and female twin pairs from the Minnesota Twin Registry representing birth cohorts from 1950 to 1955 were selected for participation in the present study (mean age = 49 years). Both MZ female and male and DZ female and male twin pairs were identified beginning with the 1955 birth cohort and proceeding until 800 individuals or 400 twin pairs had been identified. Recruitment procedures and sample characteristics of the Minnesota Twin Registry have been described in detail elsewhere (Krueger & Johnson, 2002), however twin status was not important for the purposes of the present study and results according to twin status are not reported. Three hundred thirty-two (332) individuals returned completed VIA inventories. A previous, unrelated report has been published using data from this sample (Steger, Hicks, Kashdan, Krueger, & Bouchard, 2007).

2.2. Procedure

In early 2004, packets containing consent and survey materials, a $7 incentive to participate, a pre-addressed business reply envelope, and a cover letter were mailed to participants. A response rate of 42% was obtained. A small portion of the packets were returned due to outdated addresses ($n = 17$).

2.3. Materials

Strengths were assessed using the VIA Inventory of Strengths (VIA-IS; Peterson & Seligman, 2004). Twenty-four scales are each comprised of 10 items on a scale from 1 (*very much like me*) to 5 (*very much unlike me*); thus, low scores indicate the relative presence of a strength. Criterion-related validity (Park & Peterson, 2006; Park, Peterson, & Seligman, 2004) and construct validity (Park & Peterson, 2006; Steger et al., 2007) evidence have been satisfactory. In the present study, internal consistency reliability was generally good (αs from .68 to .90, M α = .81).

2.4. Data analysis

Principal components analysis (PCA) was used to extract components. We chose this extraction method rather than factor analysis because most of our retention criteria, described next, have been used in the context of PCA (e.g., Goldberg, 2006; Russell, 2002; Steger, 2006; Zwick & Velicer, 1986). We used four criteria to judge the dimensionality of our data. First, the scree test is based on a plot of the eigenvalues of the extracted components and, where a visible break occurs between eigenvalue magnitude, subsequent components add only small amounts of variance (Russell, 2002). This criterion appears to perform better than other techniques such as the Kaiser or eigenvalues-greater-than-one ($K > 1$) criterion (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Zwick & Velicer, 1986). A second set of criteria involves component saturation (when components contain multiple moderate to large loadings) and component identification (when components load at least three variables; Velicer & Fava, 1998; Zwick & Velicer, 1986). Our third criterion, parallel analysis (PA), involves generating random data modeled on the original number of participants and variables to create eigenvalues for a given number of components. These are compared to the observed eigenvalues and those exceeding the randomly-generated eigenvalues are retained. Parallel analysis is a superior technique for determining the correct number of dimensions to retain (Floyd & Widaman, 1995; Reise, Waller, & Comrey, 2000), as demonstrated in simulation studies (Zwick & Velicer, 1986). Our final criterion involves correlating component scores across various levels of extraction, mapping where components "split" to form separate, interpretable dimensions, and determining when trivial components or factors can be discarded. When only small amounts of variance are added by extracting new components, or when "no new interesting factors appear" (p. 353), the extraction process can be terminated (Goldberg, 2006).

In terms of factor rotation, orthogonal rotations have often been used in personality research (e.g., Ashton, Lee, & Goldberg, 2004; Goldberg, 2006) and, more recently, in virtues research (e.g., Cawley et al., 2000; Peterson, Park, Pole, D'Andrea, & Seligman, 2008). In the interest of maximizing comparability across studies, we used orthogonal (Varimax) rotations. However, an oblique rotation was also performed to determine whether rotation impacted dimension interpretations.

3. Results

Table 1 shows the means and standard deviations of the 24 strengths. Scores on the VIA-IS items were slightly positively skewed, and the highest mean endorsement was found for honesty, fairness, and kindness, both results replicating previous VIA research (Park et al., 2006). Strengths receiving the lowest rates of endorsement were love of learning, self-regulation and creativity. Female participants were significantly more likely to endorse love of learning, kindness, love, teamwork, appreciation of beauty and gratitude (similar to findings in Peterson & Seligman, 2004) while males were significantly more likely to endorse self-regulation ($p < .05$).

3.1. Scree plot and parallel analysis

Eigenvalues for the first five components, all above 1.0, were 10.27, 2.17, 1.70, 1.26 and 1.06. Based on the $K > 1$ statistic, five components should be retained, a finding that fits with previous VIA research. However, using other criteria shows that retaining five components may be unjustified. Fig. 1 shows the PA and scree plots. Inspection of the scree plot shows that after the third component eigenvalues drop slightly and then begin to level off after the fourth component (Floyd & Widaman, 1995). This indicates that little variance is accounted for by more than four components. PA, using a 99% confidence interval (see Fig. 1), showed that retaining more than three components accounts only for error variance. Three- and four-component solutions accounted for 48% and 61% of the variance in the data, respectively.

3.2. Component saturation and identification

Table 3 shows the strength scale loadings for three and four extracted components. Results show that component identification was evident for both solutions but that component saturation was only found in the three-component solution. However, the lowest loading of .59 for spirituality on Component IV almost meets the cut-off for component saturation. We extracted a fifth component based on the results of previous VIA studies. A five-component solution produces a fifth component that only loads spirituality (.76), meeting the criterion for saturation but not identification. The three-component solution is justified, the four-component solution may be justified, but there is no basis for retaining five components.

3.3. Goldberg approach

Finally, the Goldberg (2006) technique reveals how the data "splits" into different dimensions as components are extracted (see Fig. 2). In this figure, labels for the components are tentative, as they were for the original VIA classification (Peterson & Seligman, 2004) and are based on the content of the scales representing each component. Three components – intellectual strengths, inter-

Table 3
Component loadings for three- and four-component solutions.

Strengths scales	Three components			Four components			
	I	II	II	I	II	III	IV
Creativity	**.82**	.06	−.10	.20	**.77**	.16	−.14
Curiosity	**.68**	.29	.23	.23	**.73**	.21	.27
Perspective	**.71**	.19	.39	.32	**.57**	.52	.02
Judgment	**.58**	.09	.53	.11	.52	**.57**	.19
Learning	**.62**	.24	.07	.09	**.77**	.00	.31
Perseverance	.33	.12	**.69**	.23	.14	**.75**	.12
Bravery	**.70**	.04	.25	.22	**.55**	.44	−.13
Honesty	.23	.31	**.66**	.32	.10	**.62**	.32
Zest	**.59**	.38	.34	.46	**.47**	.41	.13
Social intelligence	**.71**	.36	.12	**.61**	.49	.33	−.17
Kindness	.25	**.76**	.21	**.74**	.15	.16	.32
Love	.33	**.72**	.10	**.71**	.25	.07	.26
Leadership	.42	**.59**	.24	**.72**	.22	.32	.09
Fairness	.16	**.64**	.43	**.53**	.11	.30	.48
Teamwork	.11	**.76**	.24	**.69**	.04	.14	.40
Forgiveness	.03	**.55**	.44	.31	.10	.21	**.64**
Self-regulation	.29	.00	**.71**	.03	.17	**.72**	.19
Prudence	.07	.25	**.74**	.17	.00	**.63**	.44
Modesty	−.12	.33	**.57**	.09	−.06	.34	**.60**
Spirituality	.15	.35	.35	.08	.30	.12	**.59**
Beauty	**.56**	.45	−.02	.35	**.65**	−.07	.27
Hope	**.62**	.35	.31	.44	**.50**	.39	.10
Gratitude	.33	**.71**	.17	**.59**	.34	.06	.44
Humor	.50	**.52**	.00	**.71**	.30	.14	−.10

Note: the highest-loading component for each strength is bolded except spirituality in the three-component solution, which loads Components II and III equally.

personal and temperance strengths – replicate quite consistently across multiple levels of extraction, but extracting more than three components may produce components representing trivial aspects of virtue (Goldberg, 2006). For example, the component labeled spirituality in Level V consisted solely of the spirituality strength scale. While it loaded strongly on Component V, a component marked by a single variable only cannot represent a broad "factor" by definition (Zwick & Velicer, 1986). The only saturated and identified components that also replicate across all six levels of extraction are those found at Level III.

In terms of rotational strategy, oblique rotations are sometimes preferred over orthogonal ones (Reise et al., 2000). To test whether rotational strategy had an effect on loading patterns, we investigated an oblique solution for both component solutions. Loading patterns were almost identical – e.g., creativity, curiosity and learning loaded one component; kindness, teamwork and leadership another; and self-regulation, prudence and modesty another, regardless of rotation strategy.

4. Discussion

The aim of the present study was to use multiple criteria to analyze the structure of virtuous personality in an adult sample. We hypothesized that a well-fitting model would include a dimension capturing both humanity and justice strengths, an intellect dimension, and a temperance dimension. In addition, we hypothesized that between four and five dimensions would emerge at an upper limit. While not supporting a five-component model, the content of the retained VIA dimensions matched our hypotheses, discussed next.

First, parallel analysis, component saturation and identification patterns, the scree test and the Goldberg technique suggested that a three-component solution was appropriate. Three-dimensional models have often been reported in the personality literature (Eysenck, 1991; Markon, Krueger, & Watson, 2005; Tellegen & Waller, 2008), and typically have consisted of a sociability factor, a personal agency/self-assuredness factor (or, neuroticism reversed;
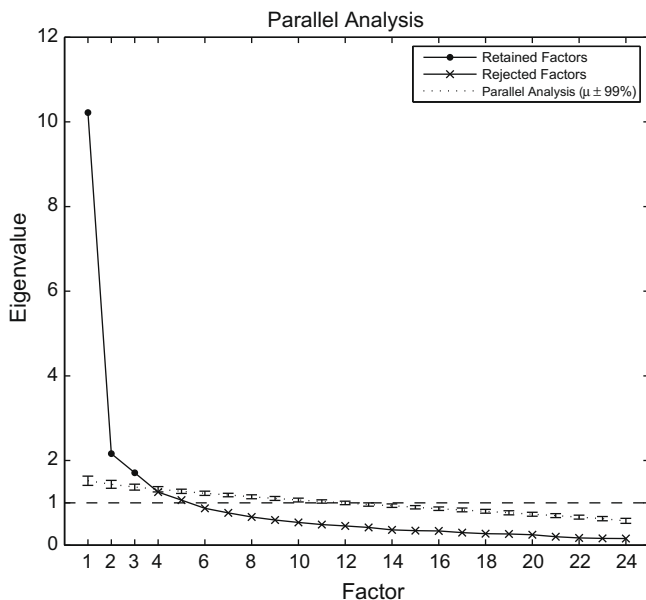

Fig. 1. Graph of actual and randomly-generated eigenvalues using a principal components extraction, indicating three components represent more than error variance.
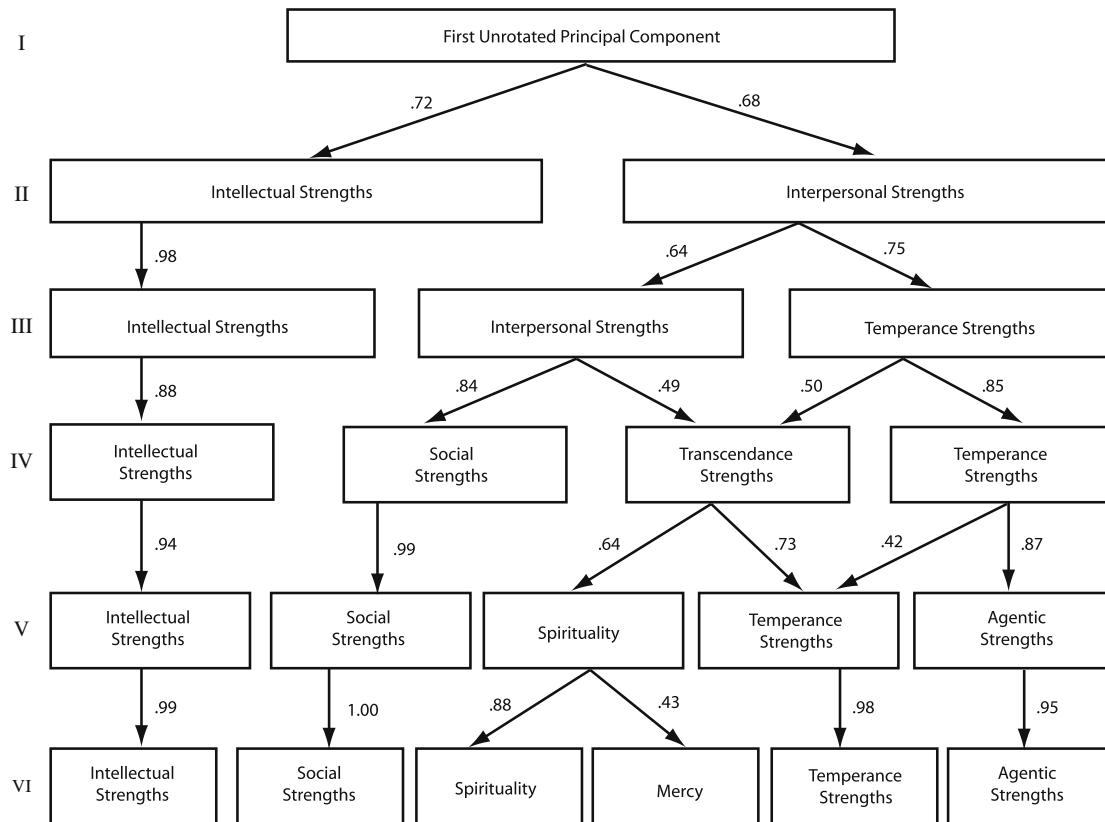
Fig. 2. Diagram of component-score correlations across six levels of extraction based on Goldberg's (2006) technique.

Ashton, Lee, Perugini et al., 2004), and a conscientiousness factor. While our results cannot be directly compared to extant personality models, we tentatively suggest that Component I may represent an agency/self-assuredness dimension,[2] Component II may represent a sociability dimension, and Component III may represent a conscientiousness dimension. However, more research is needed to determine precisely the relationship between personality and VIA virtues.

Four-dimensional models are also typical in the personality literature (Markon et al., 2005; Tellegen & Waller, 2008) and it could be argued that a four-component solution was suggested by the scree plot, component identification and, marginally, component saturation. Yet, it is unclear why modesty and forgiveness are found with spirituality on Component IV and not with temperance on Component III. Indeed, without these strengths, the interpretation of Component III as temperance may be less clear. Nevertheless, some virtues research supports a four-dimensional solution (Cawley et al., 2000; Dahlsgaard, 2005; Park & Peterson, 2006), and Component IV is somewhat similar in content to Cawley et al.'s (2000) factor labeled serenity.

In terms of virtue dimension content across both solutions, we found support for our three hypotheses. Specifically, we found a conflation of justice and humanity strengths.[3] Second, we found support for an intellectual strengths dimension including strengths such as creativity and curiosity. Finally, we found evidence for a temperance dimension (Component III in both solutions).

Two aspects of the results should be noted. First, while our findings suggest that the intellect dimension showed consistent replication across multiple levels of extraction (see Fig. 2), Cawley et al. (2000) and Walker and Pitts (1998) found no evidence for an intellect virtue. Further research on the status of this component is needed. Secondly, there was no evidence to support retaining five dimensions (our five-dimensional solution produced a fifth component loading only one strength, a divergent finding from other VIA-IS studies with adults, e.g., Peterson et al., 2008). Importantly, no two previous VIA-IS studies have produced identical results, even within similar populations (e.g., mostly white, middle-aged women respondents; Peterson & Seligman, 2004; Peterson et al., 2008). Thus, the fact that we found between three and four reliable components in this sample should not be surprising.

While our findings improve upon previous studies of virtue by using multiple criteria to determine component retention (Peterson & Seligman, 2004), this study includes the following limitations. First, while meeting the requirements of sample size when components are saturated and identified (Zwick & Velicer, 1986), a larger and more age-and culturally-diverse sample would improve the generalizability of results. In addition, the response rate of our sample was less than ideal. However, the content of some of our virtue dimensions are very similar to those found in multiple VIA studies with both youth and adult samples and may attest to the robustness of the three- or four-component solutions reported here.

In summary, understanding how the 24 VIA character strengths relate to one another in a broad-band structural model sheds light on the number of virtues needed to explain good character. An important goal of the positive psychology movement has been to describe and assess virtuous personality for the benefit of individuals and society (Peterson & Park, 2004; Peterson & Seligman, 2004). More research on the empirically-derived dimensionality

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[2] Note the high loadings of zest, social intelligence and bravery in support of an agency interpretation. Interpreting this dimension as openness – due to the high loadings of creativity, curiosity and learning – also may be warranted.

[3] The content of Component I in a three-component solution "switches places" with Component II in a four-component solution, which is referred to as rotational indeterminacy (Velicer & Fava, 1998). Nevertheless, the content of the components is the same across the two solutions.

of virtue may support and further that goal. We suggest that either three- or four-dimensional models may provide a promising framework for future investigation.

Acknowledgement

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