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Best practice recommendations for scale construction in organizational research: The development and initial validation of the character strength inventory

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Summary

Proper scale development and validation provide the necessary foundation to facilitate future quantitative research in the organizational sciences. Using the framework provided by the *Researcher's Notebook*, the purpose of this study is twofold. First, we present a modern summary of best practice procedures for scale development, reliability analysis, and validity analysis. Second, we explain and illustrate these best practice procedures by describing each procedure in the context of developing and psychometrically analyzing a new character strength inventory. Copyright © 2017 John Wiley & Sons, Ltd.

Keywords: character strength; scale development; reliability; validation; best practices

The intellect, character and skill possessed by any man are the product of certain original tendencies and the training which they have received Edward Lee Thorndike, *Educational Psychology: Briefer Course* [1914]

Since the beginning of recorded history, philosophers and practitioners alike have acknowledged the existence and importance of character (Hunter, 2000). This interest has been shared by a number of pioneering organizational researchers as well, including such esteemed scholars as Mary Goodyear Earle (1926), Raymond Filter (1921), Gladys Schwesinger (1926), and John Slawson (1922). Unfortunately, agreement on what character *is* and how it should be operationalized remains highly problematic, with character as traditionally defined being oftentimes conflated with such concepts as values and personality (Wright, 2011, 2015).

Highlighting this ageless dilemma surrounding what character *is* and *is not*, Filter (1921: 297) noted that, “The looseness of meanings attached to names of character traits demands first consideration. A trait must be defined in order to be studied intelligently.” Unfortunately, Filter failed himself to provide even a rudimentary definition of character! This construct confusion concerning character persists with the 240-item Values in Action Inventory of Strengths (VIA-IS) questionnaire (Peterson & Seligman, 2004; Peterson, Park, Hall, & Seligman, 2009). Offered free to the public on the Internet and taken by over 3.0 million individuals in over 190 countries, the VIA-IS resulted from an ambitious endeavor to measure 24 strengths of character. However, and like any scientific project of its magnitude, the VIA-IS has been increasingly subjected to careful examination and critique on both empirical and theoretical grounds (McGrath, 2014; Wright, 2015; Wright & Quick, 2011).

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Building from lessons learned regarding the VIA-IS and other attempts to operationalize character, we undertook to develop and test a new character strength measure for organizational research. Before proceeding, we note that our conversations with a number of editors at prominent management and applied psychology journals clearly indicate that journals are becoming increasingly risk averse regarding the publication of scale development articles. Due to concerns over construct proliferation, redundant measures, and other matters, the consensus is that the bar is set higher for these types of articles. As a consequence, scale development articles must now provide a clear and significant value added to the field to even be considered for publication. Using the novel format of the *Researcher's Notebook* and through the use of examples involving the actual construction of the character strength inventory (CSI), we suggest best practice recommendations for scholars interested in the development and validation of new measures designed to provide a value-added contribution to organizational research.

The need for a new character measure for organizational research

While providing an initial and worthwhile attempt to conceptualize and measure strength of character, the VIA-IS has been subjected to scrutiny on both conceptual and psychometric grounds (Brdar & Kashdan, 2010; Wright, 2014). Conceptually, this framework has been questioned regarding whether a number of their purported strengths, while certainly positive attributes, are actually strengths of character. For example, creativity, curiosity, humor, social intelligence, and zest seem lacking in a moral dimension traditionally understood to be central to any definition of character (cf. Hunter, 2000; Wright, 2011; Wright & Lauer, 2013). Other listed VIA strengths, such as “leadership,” are complex constructs in their own right, perhaps better defined as processes, and probably cannot be simply distilled to a single strength (Hannah & Avolio, 2011) (Figure 1).

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Best Practice Recommendations for Scale Development

- Best practice recommendation #1: Provide a theoretical justification for each scale item
- Best practice recommendation #2: Devote proper attention to initial scale development and content validity
- Best practice recommendation #3: Pilot test the preliminary scale
- Best practice recommendation #4: Conduct an item analysis, factor analysis, reliability analysis, and validity analysis of the preliminary scale
- Best practice recommendation #5: Assess reliability, validity, and factor structure of the revised scale in a new sample
- Best practice recommendation #6: Establish criterion validity
- Best practice recommendation #7: Report confidence intervals for all reliability and validity coefficients
- Best practice recommendation #8: Assess scale bias in the final version of the scale

Figure 1.

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A number of scholars (Macdonald, Bore, & Munro, 2008; McGrath, 2014; Wright, 2015; Wright & Quick, 2011) have also suggested the need for additional research to determine if the VIA-IS scales have adequate internal consistency, along with evidence of content and construct validity. Finally, the sheer size of the instrument, 240 items, imposes severe time constraints and attention demands on many respondents, particularly limiting its use in organizational field settings. Considered together, these challenges suggest the need for an instrument with fewer subscales, fewer items per subscale, while achieving acceptable internal consistency reliability, test–retest reliability, content validity, criterion validity, and construct validity. Further, the new instrument should be designed to not exhibit scale bias from any potential sources, including such demographic characteristics as age, gender, or ethnicity (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Wright, 2015).

In the succeeding discussion, we outline eight best practice procedures for scale development and validation using examples taken from the creation of the CSI. In doing so, we emphasize that scale validation is not an event – it is an ongoing process. Scale validation requires research across multiple samples and contexts and the inclusion of a broad set of variables with the objective of building out a given measure’s nomological network.

Best practice recommendation #1: provide a theoretical justification for each scale item

Scales serve simply to operationalize constructs and therefore must be grounded in rich theory development. Drawing on a number of sources, Wright and his colleagues (Quick & Wright, 2011; Wright & Quick, 2011) established the theoretical framework for a new character measure focused on an examination of the “master” or “cardinal” strengths of character. More specifically, it is readily apparent that certain “elevated” or preeminent strengths of character have long been acknowledged both throughout history and across culture (Peterson & Seligman, 2004; Wright & Goodstein, 2007). These “master” strengths include valor, industry, self-regulation, integrity, and critical thinking (wisdom) (Wright, 2015).

The generation of appropriate items to represent such constructs is the most important aspect in the development of sound questionnaire scales (Stone, 1978). At a minimum, a necessary prerequisite is the establishment of clear links between scale items and their theoretical domain (Hinkin, 1995). In other words, content validity requires careful development of items based on a strong theoretical framework (Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993). To that end, the first author and two graduate students conducted an extensive literature review on character in the workplace, focusing on the five master strengths. This literature review confirmed that the extant applied research on these five strengths ranged from quite limited (valor) to sketchy and ambiguous (integrity). For example, the Peterson and Seligman (2004) self-regulation scale is heavily weighted on items measuring issues surrounding eating habits (up to 30% of the items focused on issues surrounding eating habits), which does not reflect our theoretical conceptualization of this workplace character strength.

The approach we used was deductive in nature, also termed “logical partitioning” or “classification from above” (Hinkin, 1995; Hunt, 1991). Deductive scale development utilizes a classification framework prior to actual data collection. Alternatively, an inductive approach, also known as “grouping” or “classification from below” (Hinkin, 1995; Hunt, 1991) lacks a priori theoretical development and involves researchers typically asking respondents to provide examples of what constitutes the construct in question, such as valor or self-regulation. Our deductive framework required an a priori understanding of the phenomenon in question, in this case, “character strength” from our comprehensive review of the literature and extant questionnaires purporting to measure the same or similar constructs. Once the review was completed, the following construct definitions were used for valor, industry, self-regulation, integrity, and critical thinking item development (Hinkin, 1995; Schwab, 1980).

Valor involves not shrinking from threat, challenge, difficulty, or pain. Valor can be distinguished between physical and moral dimensions. Taken together, a person of valor is both willing and able to confront danger and act rightly in the face of both severe opposition and consequence (cf. Peterson & Seligman, 2004). An industrious individual is one who persists in a course of action despite setbacks and takes pride in completing tasks. One has the

strength of self-regulation, our third strength of character, if able to consistently regulate or control what one feels and actually does. A self-regulator is a disciplined individual, one who is able to exert control over their visceral appetites and emotions. The fourth strength of character is integrity or authenticity. A person of integrity is one who has the forbearance of their convictions to speak the truth and is able and willing to take responsibility for their actions. The fifth strength is critical thinking. A critical thinker is one who is both willing and able to objectively examine various topics from multiple perspectives. A critical thinker does not jump to hasty conclusions and is not easily swayed by the opinions of others (Peterson & Seligman, 2004).

Along with the extant body of knowledge (cf. Peterson & Seligman, 2004; Wright & Goodstein, 2007; Wright & Huang, 2008), our thorough literature review provided the framework for the development of the CSI. In addition, and befitting their status as “master” strengths of character, a theoretical basis now exists to posit that each one of these strengths of character is related to such correlates as psychological capital (PsyCap), Big-5 personality traits, job and life satisfaction, core self-evaluations, psychological well-being, and various aspects of work performance and achievement (e.g., Wright, 2015).

Best practice recommendation #2: devote proper attention to initial scale development and content validity

There are several important measurement considerations in scale development. The first involves the actual number of items in the measure (Hinkin, 1995). Cronbach and Meehl (1955) noted the need to carefully consider the sometimes conflicting objectives of establishing *both* adequate domain sampling *and* parsimony. While item parsimony is especially relevant in minimizing potential response bias (Schmidt & Stults, 1985), scales with too few items may lack not only content and construct validity but also internal consistency and test–retest reliability (Hinkin, 1995; Nunnally, 1976).

A second measurement consideration involves the use of reverse-scored (negatively worded) items. While reverse-scored items may attenuate response-pattern bias, reverse scoring may also introduce systematic error to a questionnaire (Jackson, Wall, Martin, & Davids, 1993). In the construction of the CSI, we were careful to key all items in the same direction, so that *very much like me* was always associated with more of the strength of character. A third measurement consideration involves the development of a questionnaire that generates sufficient response variance. Likert-type scales are the most widely used in the organizational sciences, with 5-point and 7-point scales being especially popular.

Following past practice (e.g., Ferris et al., 2005) and building upon our best practice recommendation #1, the procedure used in the present research involved the generation of original items for each of the five character strengths: valor, industry, self-regulation, integrity, and critical thinking. The mission was to generate a “critical mass” minimum of 20–25 initial items per character strength through an iterative process where scale items were added, deleted, or revised. The goal was that the initial items retained for inclusion in the survey had to differ from the extant body of research and demonstrate content validity. Content validity is reflective of the adequacy with which a measure assesses the domain of interest (Hinkin, 1995). The end product resulted in an initial pool of 105 items found appropriate to representatively assess the five strengths of character. Also included in the developmental questionnaire, and only for the purpose of comparison, were a number of non-modified items commonly used in the VIA-IS instrument for the same five character strengths. Those items were provided to the lead author by VIA-IS author Christopher Peterson.

Best practice recommendation #3: pilot test the preliminary scale

By this stage of the process, a potential set of items has been identified. The use of a pilot study format has proven highly useful in the further development of psychometrically rigorous scales (Slavec & Drnovsek,

2012). In the present case, and with the objective of being representative of research populations targeted for future study, we conducted a pilot study using undergraduate management students. Adding further confidence in the potential generalizability of our findings to both student and working populations, most of the participants were also employed, working adults, with many working 40 h or more per week. Pilot study participants were incentivized by extra credit in the course in which they were enrolled. The results of the evaluative portion of the pilot survey indicated that participants found the survey to be understandable, readable, usable, and to have clear instructions. Given the obvious time constraints inherent in the 240-item VIA-IS instrument, our pilot study was specifically designed to demonstrate an acceptable response time range for the questionnaire.

Best practice recommendation #4: conduct an item analysis, factor analysis, reliability analysis, and validity analysis of the preliminary scale

There is a need for incorporating a multiple study approach to scale development (Dahling, Whitaker, & Levy, 2009; Ferris et al., 2005) to ensure psychometric properties hold across samples. In addition, two criticisms abound in the current strengths of character literature. The first involves the failure to include working adult samples to examine character. The second involves the recurring omission of estimating internal consistency and, if appropriate, test–retest reliability with adequate precision. Confidence intervals (CIs) for the population reliability values also should be reported as explained in Bonett and Wright (2007, 2015). Test–retest reliability is appropriate primarily for trait measures. Following best practice guidelines, our research both highlights and addresses each of these concerns.

Our initial study (hereafter referred to as Study 1) was conducted at a major public research university in the southwestern United States. All participants were enrolled in upper management level courses and voluntarily participated in order to fulfill their course research requirement. The ethnicity of the sample was quite diverse and included significant numbers of White, Asian, Hispanic, and African-American participants. The sample was reasonably distributed between female (52.1%) and male (47.9%) respondents. The age of the participants ranged from 18 to 55 years, with an average age of 24.2 ($SD = 5.7$). Building upon the completion time results of our Pilot Study, it was decided to exclude all participants who completed the survey in less than 15 min (1.5 standard deviations below the average completion time in the Pilot Study) or over 60 min (four standard deviations above the average completion time in the Pilot Study).

Our best practice recommendation to retain only those items that provide the best representation of each of the strengths of character while also measuring each construct in the most parsimonious possible way resulted in the selection of eight items for each of the character scales (40 items) out of the initial item pool of 105. Cronbach alphas ranged from integrity ($\alpha = .83$, 95% CI = [.80, .86]) to industry ($\alpha = .91$, 95% CI = [.90, .92]). For illustrative purposes, the Time 1 alpha reliability estimates of the five CSI scales in Study 1 and Study 2 are shown in Table 1. To establish test–retest reliability, a second phase (Time 2) was conducted approximately three weeks after the completion of the first survey phase. In Study 1, test–retest reliabilities ranged from .75 (95% CI = [.68, .80], self-regulation) to .83 (95% CI = [.77, .87], industry). The Study 1 and Study 2 test–retest reliabilities for the five CSI scales and the CSI scale sum are shown in Table 2. The alpha reliabilities in Table 1 and the test–retest reliabilities in Table 2 suggest that the new CSI scales have excellent reliability characteristics.

Our theory development led us to predict that the five CSI scales would have a single-factor structure. Table 3 shows that the five CSI scales are moderately correlated. An exploratory factor analysis for the five CSI scales produced one large eigenvalue and four small (<1) eigenvalues, which provides strong support for the hypothesized one-factor model. The standardized factor loadings of the one-factor model for Study 1 are given in Table 4. All loadings are large and range from about .79 to .90.

Table 1. Alpha reliabilities (Time 1).

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Scale	Study 1			Study 2		
	<i>N</i>	Reliability	95% CI	<i>N</i>	Reliability	95% CI
Valor	341	.886	[.867, .903]	259	.885	[.862, .905]
Integrity	345	.831	[.802, .856]	255	.868	[.842, .891]
Industry	338	.910	[.895, .924]	253	.895	[.874, .913]
Self-regulation	335	.869	[.846, .889]	252	.854	[.825, .880]
Critical thinking	343	.891	[.873, .908]	253	.898	[.878, .916]

Note: CI = confidence interval.

Table 2. Test–retest reliabilities.

Scale	Study 1			Study 2		
	<i>N</i>	Reliability	95% CI	<i>N</i>	Reliability	95% CI
Valor	195	.812	[.758, .855]	160	.861	[.815, .896]
Integrity	193	.781	[.719, .831]	155	.867	[.822, .901]
Industry	192	.825	[.774, .865]	152	.874	[.830, .907]
Self-regulation	191	.748	[.678, .804]	153	.853	[.803, .891]
Critical thinking	195	.752	[.684, .807]	154	.815	[.754, .862]
Total	171	.856	[.812, .890]	129	.913	[.879, .938]

Note: CI = confidence interval.

Table 3. Descriptive statistics (Time 1).

	Valor	Self-regulation	Integrity	Industry	Critical thinking
Study 1					
Valor	—	.642	.687	.716	.675
Self-regulation	—	—	.683	.805	.753
Integrity	—	—	—	.697	.657
Industry	—	—	—	—	.743
Mean	44.1	43.1	47.0	44.5	44.4
<i>SD</i>	6.62	7.45	5.77	7.02	6.78
<i>N</i>	340	335	342	338	342
Study 2					
Valor	—	.679	.659	.710	.648
Self-regulation	—	—	.657	.766	.670
Integrity	—	—	—	.696	.632
Industry	—	—	—	—	.655
Mean	43.1	37.3	46.5	45.4	43.1
<i>SD</i>	6.78	6.04	5.99	6.96	6.73
<i>N</i>	259	253	255	253	253

Convergent and discriminant validity respectively reflect the extent to which a measure relates to similar constructs and does not strongly relate to constructs from which it should differ (Ferris et al., 2005). In the case of the CSI, character is best theoretically considered as being shaped by one's convictions and is evidenced by the

Table 4. Standardized factor loadings for general factor (Time 1).

Scale	Study 1	Study 2
Valor	.789	.802
Integrity	.793	.789
Industry	.900	.869
Self-regulation	.868	.853
Critical thinking	.839	.763

ability to persist in those convictions in the face of temptation or challenge (Hunter, 2000). Wright and Lauer (2013: 27) define character as “those interpenetrable and habitual qualities within individuals, and applicable to organizations that both constrain and lead them to desire and pursue personal and societal good.” From this definitional perspective, character is proposed to be distinguishable from values (Wright & Quick, 2011), personality (Wright & Lauer, 2013), and such positive personal resources as psychological capital or PsyCap (cf., hope, optimism, efficacy, and resilience; Wright, 2015).

Construct validity focuses on the relationship of the measure(s) with the underlying attributes it is attempting to assess (Hinkin, 1995: 968). To establish construct validity for the CSI, we examined the relationships among the five CSI character strengths and a variety of well-established individual-level measures of psychological attributes and resources. For example, each CSI scale was correlated in a theoretically predicted manner and magnitude with the positive resource attribute PsyCap (Luthans, Youssef, & Avolio, 2007), life satisfaction (Diener, Emmons, Larsen, & Griffin, 1985), positive and negative well-being (Wright & Huang, 2009), traits from the Big-5 Personality Inventory (Soto & John, 2008), and the core self evaluations scale (CSES; Judge, Erez, Bono, & Thoresen, 2003). The CSES contains the values-based dimensions of self-esteem and generalized self-efficacy. As hypothesized in Study 1 (T1) and using Wright and Huang’s (2009) 10-item scale, negative well-being negatively correlated with valor ($r = -.33$, 95% CI = $[-.42, -.23]$), integrity ($r = -.36$, 95% CI = $[-.45, -.26]$), industry ($r = -.34$, 95% CI = $[-.43, -.24]$), self-regulation ($r = -.31$, 95% CI = $[-.40, -.21]$), and critical thinking ($r = -.32$, 95% CI = $[-.41, -.22]$). Alternatively, Wright and Huang’s (2009) 10-item positive well-being scale was positively correlated with valor ($r = .43$, 95% CI = $[.34, .51]$), integrity ($r = .44$, 95% CI = $[.35, .52]$), industry ($r = .39$, 95% CI = $[.29, .48]$), self-regulation ($r = .34$, 95% CI = $[.24, .43]$), and critical thinking ($r = .32$, 95% CI = $[.22, .41]$).

Regarding our five character strengths and their possible convergent relationship with similar strengths as measured by the VIA-IS instrument, we expected that our scales would be highly correlated with the VIA-IS-derived strengths of character. As expected, the results in Table 5 suggest that the shorter CSI scales have a desirably high correlation with the VIA-IS scales.

Table 5. Correlations between the Five VIA and CSI scales (Time 1).

Scale	Study 1			Study 2		
	<i>N</i>	Correlation	95% CI	<i>N</i>	Correlation	95% CI
Valor	328	.875	[.847, .898]	254	.889	[.871, .919]
Integrity	323	.815	[.775, .849]	245	.847	[.807, .879]
Industry	328	.908	[.887, .925]	247	.925	[.905, .941]
Self-regulation	329	.733	[.679, .779]	242	.725	[.659, .780]
Critical thinking	329	.877	[.849, .900]	243	.817	[.770, .855]

Note: CI = confidence interval; VIA = values in action; CSI, character strength inventory.

The initial CSI scales exhibited excellent internal consistency and test–re–test reliability along with evidence of construct validity. No revisions to the initial scales were deemed necessary, possibly because of our unusually thorough preliminary scale development. Some scholars make the mistake of adding or removing items at this stage of scale development in an effort to improve internal consistency reliability. However, item revisions that improve internal consistency might also reduce test–re–test reliability or validity. It is important to retain items that provide the best combination of internal consistency reliability, test–re–test reliability, and validity.

Best practice recommendation #5: assess reliability, validity, and factor structure of the revised scale in a new sample

In accordance with our best practice recommendation for a multiple study approach, we conducted a data gathering procedure in Study 2 designed to help ensure a population composed of primarily working adults. Similar to data gathering procedures used in published research in well-respected journals within the organizational sciences discipline (cf., Crossley, Bennett, Jex, & Burnfield, 2007; Piccolo & Colquitt, 2006), Study 2 was conducted using the paid services of the StudyResponse Center for Online Research (SRCOR) at Syracuse University. The SRCOR project was initiated to foster online research for social and organizational science researchers through the facilitation of email participation requests to adult research participants. Prior to answering any questions on our survey, participants were required to give their informed consent by logging in with a subject number provided by SRCOR.

We verified that all SRCOR participants matched those invited. The participants were then asked to self-report on a series of demographic and work questions. For example, as with Study 1, the sample was well represented across gender with women comprising 53.6% of the respondents. The age of the participants was more diverse than Study 1 and ranged from 22 to 70 with an average age of 43.6 ($SD = 11.5$). Unlike Study 1, Study 2 was composed of working adults, with the average number of hours worked per week at 41 ($SD = 8.4$). As with Sample 1, three week test–retest reliability coefficients were established. Finally, we used the same response-time criteria as in the first survey to exclude outlier responses.

A multiple study design is highly useful to help ensure that the derived factor structure is not simply an artifact of the initial study design, data collection method, or sample obtained for analysis (Ferris et al., 2005). As anticipated, Cronbach alphas were highly consistent to those obtained in Study 1, ranging from self-regulation ($\alpha = .85$, 95% CI = [.83, .88]) to critical thinking ($\alpha = .90$, 95% CI = [.88, .92]). As with Study 1, the Time 1 alpha reliability estimates of the five CSI scales in Study 2 are shown in Table 1. In Study 2, an exploratory factor analysis for the five CSI scales produced one large eigenvalue and four small (<1) eigenvalues, which, as in Study 1, provides strong support for the hypothesized one-factor model. The standardized factor loadings of the one-factor model for Study 2 are given in Table 4. All loadings are large, ranging from about .76 to .87 and are very similar to the factors loadings obtained in Study 1.

The construct validity of the CSI was further established in Study 2 (T1). For example, life satisfaction was positively correlated with valor ($r = .29$, 95% CI = [.17, .40]), integrity ($r = .22$, 95% CI = [.10, .33]), industry ($r = .33$, 95% CI = [.21, .43]), self-regulation ($r = .43$, 95% CI = [.32, .53]), and critical thinking ($r = .29$, 95% CI = [.17, .40]). Regarding a character with personality relationship, the Big-5 construct, extraversion, was positively correlated with valor ($r = .54$, 95% CI = [.44, .62]), integrity ($r = .20$, 95% CI = [.08, .32]), industry ($r = .32$, 95% CI = [.20, .43]), self-regulation ($r = .39$, 95% CI = [.28, .49]), and critical thinking ($r = .32$, 95% CI = [.20, .43]). Alternatively, and as expected, neuroticism was negatively correlated with valor ($r = -.45$, 95% CI = [-.54, -.34]), integrity ($r = -.38$, 95% CI = [-.48, -.27]), industry ($r = -.42$, 95% CI = [-.52, -.31]), self-regulation ($r = -.52$, 95% CI = [-.61, -.42]), and critical thinking ($r = -.39$, 95% CI = [-.49, -.28]). Further details are available from the corresponding author. Considered together, the results obtained clearly demonstrate that the

relationships among the five character strengths and each of the variables examined were in the expected direction and general magnitude.

Best practice recommendation #6: establish criterion validity

Tests of criterion (concurrent or predictive) validity are needed to build out the nomological network of new constructs. We suggest that the five CSI scales would predict, for example, job satisfaction, achievement, and performance. In the present research, we tested whether the five strengths, valor, integrity, industry, self-regulation, and critical thinking would demonstrate significant predictive validity for job satisfaction. Job satisfaction plays a significant role in the determination of a number of organizational behaviors, including psychological well-being, life satisfaction, PsyCap, CSES, the Big-5 personality inventory, and job performance. In the present research, we proposed that our five strengths of character at T1, valor, integrity, industry, self-regulation, and critical thinking would demonstrate predictive validity for job satisfaction at T2.

Adopting the instrument used by Wright and Cropanzano (1998), we measured job satisfaction with five widely recognized dimensions of the satisfaction construct: degree of satisfaction with the work itself, degree of satisfaction with coworkers, degree of satisfaction with the supervision, degree of satisfaction with the promotional opportunities, and degree of satisfaction with pay. In Study 2, the Time 1 measures of valor ($r = .32$, 95% CI = [.17, .45]), integrity ($r = .27$, 95% CI = [.12, .41]), industry ($r = .40$, 95% CI = [.26, .52]), self-regulation ($r = .36$, 95% CI = [.21, .49]), and critical thinking ($r = .43$, 95% CI = [.29, .55]) were found to be positively correlated with the composite measure of job satisfaction at Time 2.

Scholars also have proposed that the “top-5” signature strength profile of valor, integrity, industry, critical-thinking, and self-regulation may be related to measures of job performance and achievement (Wright & Quick, 2011; Wright & Lauer, 2015; Wright, 2015). More specifically, preliminary evidence from an academic setting suggests that the strengths of industry and critical thinking may be related to academic achievement. However, to date, evidence supporting this contention is still tentative. Building upon these initial findings, research using the CSI is now needed to investigate the relationships among various strengths of character and job-related performance and effectiveness criteria.

Best practice recommendation #7: report confidence intervals for all reliability and validity coefficients

Typically, and for any number of reasons, researchers have chosen to report only the sample reliability coefficient. As one example, for Study 1 (T1), this would translate into reporting only a Cronbach’s coefficient alpha of .83 for integrity. However, we recommend that future research also report CIs (Bonett & Wright, 2007) for reliability and validity coefficients. That is, rather than reporting only the sample estimate of a reliability or validity coefficient (i.e., $\alpha = .83$ for integrity), we encourage scholars to report the range of plausible values for the population reliability or validity coefficient with a specified level of “confidence.” Thus, in our present example for integrity, we reported ($\alpha = .83$, 95% CI = [.80, .86]).

In addition to traditional reliability assessment, it is also a useful best practice to examine “differential reliability” – the difference in reliability across different types of populations. For example, it is important for us to determine if the reliability of the CSI subscales is similar across two study populations that differed in average age, geographic characteristics, and employment status. With that objective in mind, we used the method described by Bonett (2010) to obtain a CI for differences in alpha reliabilities between men and women. All of the CIs included zero and were sufficiently narrow for us to conclude that Cronbach reliability for each CSI subscale is similar in the male and female populations.

We also recommend that test–retest analysis should be used whenever possible to help further establish scale reliability. The test–retest reliabilities for the five CSI scales and the CSI scale sum are shown in Table 2 for both studies. Consistent with our best practice recommendations, we report our test–retest reliabilities along with 95% CIs. To assess differential test–retest reliability across our two study populations, which differed in average age, geographic characteristics, and employment status, we used a method described in Bonett (2008) to obtain CIs for the test–retest correlation differences. The test–retest reliability was found to be slightly larger in the population of older, working adults than the population of younger, college students for integrity (95% CI [.019, .055]), self-regulation (95% CI [.030, .184]), and the CSI sum (95% CI [.010, .108]).

Confidence intervals for validity correlations should also be reported as illustrated above. If the CI suggests that the correlation between the new scale and another variable is sufficiently small, that would provide important discriminant validity evidence. Or, if the CI suggests that the correlation between the new scale and another variable is sufficiently large, that would provide important convergent validity evidence. Note that the traditional null hypothesis testing approach is not appropriate for assessing discriminant and convergent validity. Specifically, a “non-significant” null hypothesis test result is not evidence of discriminant validity and a “significant” null hypothesis test result is not evidence of convergent validity. Hypothesis testing misinterpretations are also very common in confirmatory factor analysis applications of construct validity where an acceptable model is rejected because the GOF p -value is less than .05 or when a substantially misspecified model is declared to “provide a good fit” because the GOF p -value is greater than .05.

It is not appropriate to refer to “the reliability” of a scale. Reliability can be described in terms of internal consistency reliability for a particular set of items, and test–retest reliability can be described for a particular time interval. For scales with multiple versions, alternative form reliability also can be assessed. It is important to reassess internal consistency reliability if any items are added or removed from the scale, and it is useful to examine test–retest reliability for different time intervals. Furthermore, internal consistency and test–retest reliability might differ substantially across different testing situations or different demographic subpopulations. Multiple studies, ideally conducted by different researchers, are typically needed to assess reliability across a wide range of interesting testing conditions and demographic subpopulations.

Although it is possible to describe the reliability of a scale under specific testing conditions and for specific types of respondents, validity assessment should be viewed as an ongoing process. No single validity study, or even a series of validity studies, can show that a scale is “valid.” Thus, it is inappropriate for researchers to claim that the scale they are using “has been shown to be valid.” Each validity analysis simply provides incomplete evidence that can be used to augment a claim of scale validity, with more evidence providing a more compelling claim of scale validity. For example, a series of criterion validity studies with different criteria can provide more convincing evidence of criterion validity than a single-criterion validation study. Construct validation evidence is more difficult to acquire than criterion validity evidence. The classic dichotomy of “discriminant” and “convergent” validity is an artificial oversimplification because the scale under investigation needs to correlate with a wide variety of other scales with theoretically predicted magnitudes and directions that could range anywhere from near zero to near 1 or –1.

It is important to remember that reliability and validity estimates obtained from a single study contain sampling error and a CI for the population reliability or validity coefficient might be uselessly wide. We recommend using meta-analysis methods to combine and compare reliability and validity estimates obtained from different studies. The CI for an average reliability coefficient or an average validity coefficient from two or more studies will usually be considerably narrower than the CIs obtained from individual studies (Bonett, 2008, 2010).

Best practice recommendation #8: assess scale bias in the final version of the scale

While we often discuss scale bias as a very serious challenge in scale development, the actual investigation of various types of possible scale bias (e.g., based on individual or cultural differences) is seldom put to an empirical test. For example, the need for character scholars to be aware of the possibility of gender bias has been previously noted

Table 6. Gender differences (Study 2: Time 1).

Scale	Women			Men			<i>p</i>	95% CI
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>		
Valor	119	43.2	6.98	137	42.9	6.65	.624	[−1.26, 2.10]
Integrity	116	45.9	6.11	135	47.1	5.63	.113	[−2.64, 0.28]
Industry	117	45.4	7.25	132	45.5	6.60	.888	[−1.85, 1.60]
Self-regulation	116	37.6	5.73	134	37.0	6.24	.481	[−0.96, 2.04]
Critical thinking	114	43.2	6.61	135	43.0	6.79	.827	[−1.49, 1.87]

Note: *p* is a two-sided *p*-value for a *t*-test of equal population gender means; 95% CI is the confidence interval for the difference in women and men population means.

(cf. Wright, 2015; Wright & Quick, 2011). To assess the magnitude of gender bias in the CSI scales, CIs for differences in population means for men and women were performed on the CSI scales at Time 1 in both Study 1 and Study 2. All of the 95% CIs for population mean differences included zero and were sufficiently narrow for us to conclude that gender differences in the five CSI scales are small. The Time 1 means and standard deviations are given in Table 6 for male and female respondents in Study 2 for the five CSI scales.

T6

Discussion

We provided eight best practice recommendations for scale development using the initial development of the five CSI scales for valor, industry, integrity, critical thinking, and self-regulation. These scales were theoretically derived for application to organizational and applied settings and have fewer items (eight items per scale) than the corresponding VIA-IS scales (typically 10 items per scale) while maintaining consistency to the VIA-IS scales in terms of both internal consistency and test–retest reliability. In addition, no gender bias in the new CSI scales was detected. The CSI scales have strong positive correlations with the corresponding and longer VIA-IS scales.

Central to our best practice recommendation format was the development of the CSI's nomological network. To that end, the CSI scales correlated with a variety of other psychological attributes and with the predicted magnitude and direction. A factor analysis of the five CSI scales clearly showed the theoretically predicted one-factor structure. The short length (eight items each) and the demonstrated psychometric properties of the new CSI scales should provide a useful assessment tool for future research aimed at discovering the factors that affect character strength as well as the consequences of training programs designed to build character strength.

Of course, additional tests and replications are needed to further validate the CSI instrument. As one example, while the “master” strengths of character have historically been assumed to have an underlying moral component, it remains for future research to determine if this is, in fact, the case. More specifically, while critical thinking (wisdom) is certainly a positive attribute, it may not have a moral component as typically considered by both the CSI and VIA-IS. In sum, the prospects for the continued growth of scholarly attention to the topic of character will depend in great part on both further conceptual and methodological development.

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Appendix: Character Strength Inventory (CSI) Scale Items (7-point scales)

Valor Scale

In the face of strong opposition I always do the right thing.
 When necessary, I act, even when others hesitate.
 I stand up for the rights of others.
 Those who know me consider me a courageous person.
 Even when others conform I maintain my beliefs.
 I act courageously even in the face of strong opposition.
 Even when others conform I will express my beliefs.
 I will act in the face of fear.

Integrity Scale

I believe everybody has the responsibility to tell the truth.
 I believe it is never acceptable for anyone to cheat.
 Honesty is always the best policy.
 Others can trust me.
 I am truthful.
 I always act in line with my values.
 I have strong character.
 I always practice what I preach.

Industry Scale

I never quit a task until I am satisfied with the result.
 I work very hard for what I want.
 I always finish what I start in a competent manner.
 When I set a goal, I work until I achieve it.
 I always complete my task no matter what.
 I am very resourceful.
 I am highly disciplined.
 I always work hard to accomplish my assigned tasks.

Critical-Thinking

Even after a decision is made I keep an open mind about possible alternatives.
 I always objectively examine all sides of an issue.
 I always keep an open mind before I act.
 I always assess the accuracy of my information.
 I always identify in advance all of the possible consequences of my actions.
 I always consider all available evidence before coming to a conclusion.
 I am always open to alternatives.
 I always think before I act.

Self-Regulation

I always stay on schedule.
 I always complete my tasks on time.
 I do not allow distractions to hinder my performance.
 I set priorities to achieve optimal (work-life) balance in my life.
 When assigned multiple tasks I can finish them all by their due date.
 I can keep myself from ruminating on negative events.
 I always exhibit self-control.
 I maintain focus when working.

Note. Items are measured using 7-point Likert scales anchored with the following: "Very much unlike me"; "Unlike me"; "Somewhat unlike me"; "Neither like me nor unlike me"; "Somewhat like me"; "Like me"; "Very much like me".

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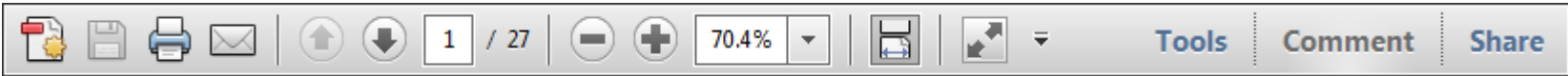
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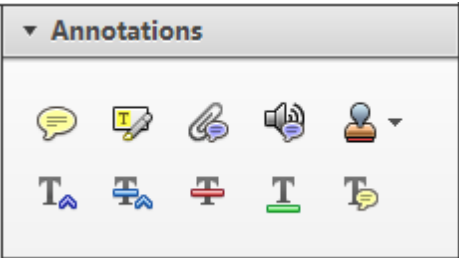
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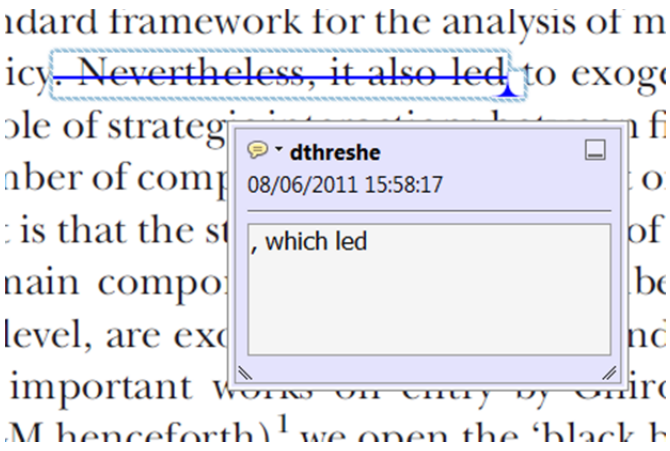
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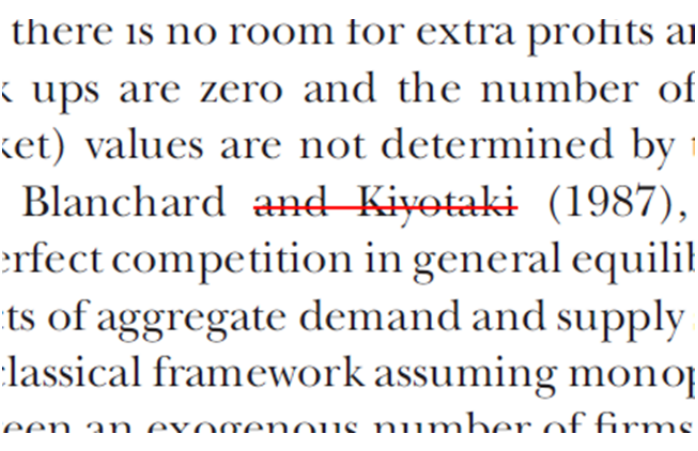
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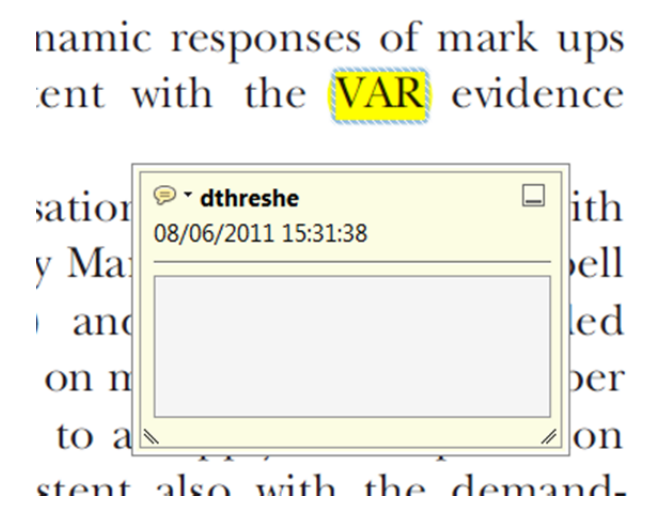
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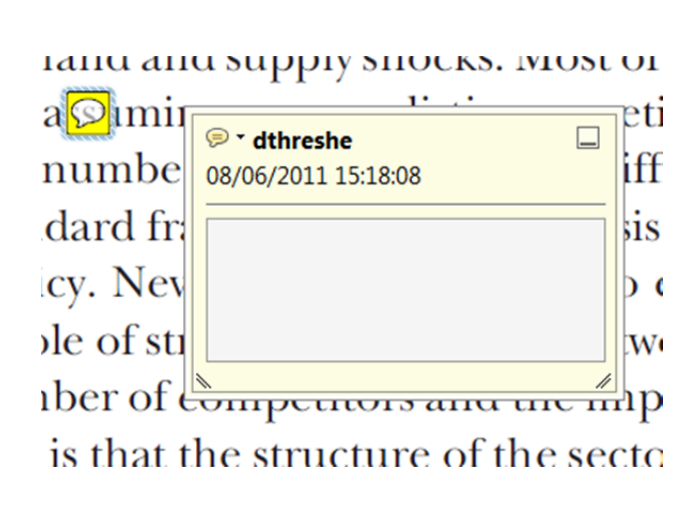
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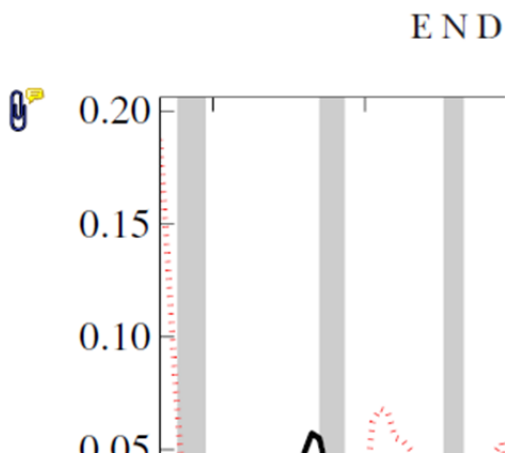


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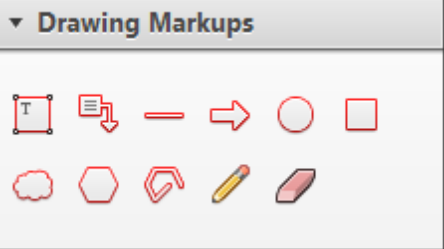
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on perfect competition, constant returns
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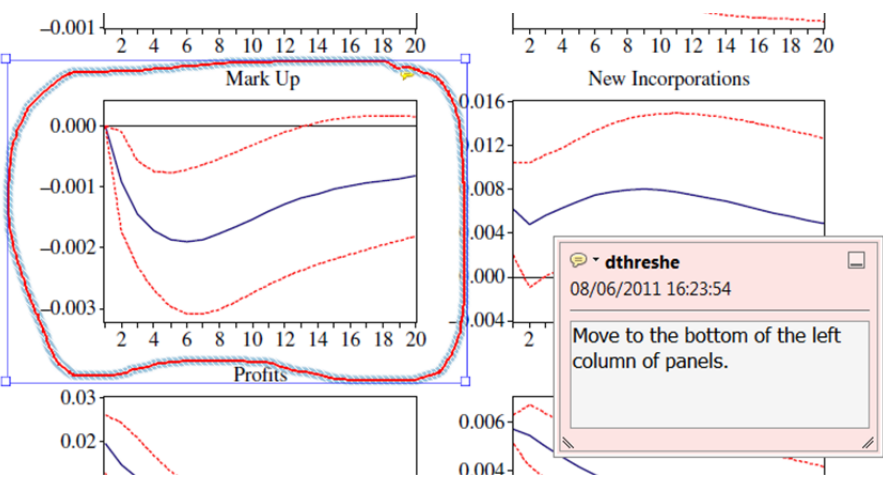


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