Article

Psychometric Properties of the HEXACO-100

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Abstract

Psychometric properties of the 100-item English-language HEXACO Personality Inventory–Revised (HEXACO-PI-R) were examined using samples of online respondents (*N* = 100,318 self-reports) and of undergraduate students (*N* = 2,868 self- and observer reports). The results were as follows: First, the hierarchical structure of the HEXACO-100 was clearly supported in two principal components analyses: each of the six factors was defined by its constituent facets and each of the 25 facets was defined by its constituent items. Second, the HEXACO-100 factor scales showed fairly low intercorrelations, with only one pair of scales (Honesty–Humility and Agreeableness) having an absolute correlation above .20 in self-report data. Third, the factor and facet scales showed strong self/observer convergent correlations, which far exceeded the self/observer discriminant correlations.

Keywords

HEXACO, Honesty–Humility, personality measurement, personality structure, self/observer agreement

The HEXACO model of personality structure was first proposed in the early 2000s, and it has been increasingly widely used as an organizing framework in personality research. This model posits that personality traits can be summarized by six dimensions: Honesty–Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O) (Ashton & Lee, 2001, 2007). The most widely used measure of these six personality dimensions is the HEXACO Personality Inventory–Revised (HEXACO-PI-R), a self- or observer report instrument that is available in 200-, 100-, and 60-item versions (Ashton & Lee, 2009; Lee & Ashton, 2004, 2006), with the latter two being widely used in personality research. Although there is a published article reporting the detailed psychometric properties of the HEXACO-60 (Ashton & Lee, 2009), there has not yet been such an article specific to the HEXACO-100, except for some brief reports on other language versions of it (e.g., Romero, Villar, & López-Romero, 2015). In the present research, we report the psychometric properties of the HEXACO-100 using two large data sets cumulated in the past few years.

The HEXACO Model of Personality Structure

As with the five-factor model (FFM), the HEXACO model originated from research based on the lexical approach to personality structure. In typical lexically based studies of personality structure, researchers compile a comprehensive list of familiar personality-descriptive adjectives of a given language. Self- or observer ratings on the adjectives, as provided by a large sample of participants, are then factor analyzed to identify a few major dimensions that explain much of the covariation among those terms. Research of this kind has been conducted in several European and Asian languages, and the largest factor space to replicate widely across languages has been the six-factor solution (see Ashton et al., 2004; De Raad et al., 2014; Lee & Ashton, 2008). The content of the HEXACO-PI-R was based in large part on that of the six cross-culturally replicated lexical personality factors.

The precursor of the HEXACO-PI-R (the HEXACO-PI) was introduced by Lee and Ashton (2004). This earlier instrument contained six broad factor-level scales, each of which included four facet-level scales. A 25th facet-level scale, Altruism, was later added both because of the importance of that trait (as shown by the heavy representation of relevant terms in personality lexicons) and also because of its role in the theoretical interpretation of the HEXACO factors; note that Altruism is an "interstitial" facet, which is expected to divide its loadings across three factors (Honesty–Humility, Emotionality, and Agreeableness). Another interstitial facet-level scale, Negative Self-Evaluation, was added but later removed, at which point the Expressiveness facet-level scale

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of Extraversion was replaced by the Social Self-Esteem facet-level scale. These changes completed the HEXACO-PI-R, which thus contains 25 facet-level scales, including 24 univocal facets plus the interstitial Altruism facet. For a detailed history of the HEXACO-PI-R, see http://hexaco.org/history, and for definitions of its factor- and facet-level scales, see http://hexaco.org/scaledescriptions.

As discussed elsewhere (Ashton & Lee, 2007; Lee & Ashton, 2012b), the theoretical interpretation of the six HEXACO personality factors categorizes them into two broad conceptual groups. First, the Extraversion, Conscientiousness, and Openness to Experience dimensions represent individual differences in engagement within three different domains of endeavor: social, work-related, and idea-related. Second, the Honesty–Humility, Emotionality, and Agreeableness dimensions represent individual differences in three different forms of altruistic tendencies. Specifically, Honesty–Humility represents a tendency to treat others fairly even when one could successfully exploit them, and Agreeableness represents a tendency to be patient with others even when one may be treated unfairly by them. In this way, Honesty–Humility and Agreeableness represent two forms of reciprocal-altruistic tendency. Emotionality is conceptualized to represent a tendency to prevent harms to self and kin, and is thereby relevant to kin altruism (see detailed discussion in Ashton & Lee, 2007).

The latter three personality dimensions distinguish the HEXACO model from the FFM. Specifically, the variance in FFM Agreeableness and Emotional Stability is redistributed into these three HEXACO dimensions, which also incorporate a large amount of new variance not captured by the FFM. This latter fact was demonstrated in Lee and Ashton's (2013) comparison between the NEO Five-Factor Inventory and HEXACO-60 in which each of the FFM dimensions was explained by the full set of HEXACO dimensions, and vice versa. Results indicated that although all of the FFM dimensions were accounted for adequately by the HEXACO dimensions, HEXACO Honesty–Humility, Emotionality, and (to a lesser degree) Agreeableness were not satisfactorily accounted for by the FFM dimensions. These results were obtained in cross-source analyses (whereby self-reports were used in predicting observer reports, or vice versa) as well as same-source analyses, and have also been found in same-source analyses involving the full-length versions of the two inventories (Gaughan, Miller, & Lynam, 2012).

The recognition that the HEXACO model contains variance not shared with the FFM has inspired several empirical studies examining the HEXACO factors in relation to various outcome variables. Many of these studies investigated variables that are expected to be related to the Honesty–Humility, Emotionality, or Agreeableness dimensions. Among these variables are guilt and shame proneness (Cohen, Wolf, Panter, & Insko, 2011), moral character (Cohen, Panter, Turan, Morse, & Kim, 2014), altruistic behavior in economic game contexts (Hilbig & Zettler, 2009; Zettler, Hilbig, & Heydasch, 2013), religiousness (Aghababaei, Wasserman, & Nannini, 2014; Saroglou, Pichon, Trompette, Verschueren, & Dernelle, 2005), risk taking (Ashton, Lee, Pozzebon, Visser, & Worth, 2010; Weller & Thulin, 2012), the "dark triad" traits (Lee et al., 2013), workplace impression management behaviors (Bourdage, Wiltshire, & Lee, 2015), forgiving versus retaliating behaviors (Lee & Ashton, 2012a), phobic tendencies (Ashton, Lee, Visser, & Pozzebon, 2008), schizotypy (Winterstein et al., 2011), vocational interests (McKay & Tokar, 2012), political attitudes (Chirumbolo & Leone, 2010; Zettler, Hilbig, & Haubrich, 2011), academic aptitude and performance (Noftle & Robins, 2007), and so on. The use of the HEXACO model as an organizing framework for personality characteristics has been steeply increasing in recent years.

In this article, we provide psychometric information on the 100-item English-language version of the HEXACO-PI-R. The results reported here are based on two large data sets. First, we collected self-reports through the HEXACO-PI-R online survey site. This site was originally developed in 2009 to provide basic information about the inventory and to allow researchers and teachers to download the inventory materials in various languages. In October 2014, we added a HEXACO online survey page to this website, where any visitors wishing to learn about their HEXACO personality profile can complete the inventory online. We used here the data collected through this online survey site cumulated over its first full year. Second, we also obtained self-reports on the HEXACO-100, as well as observer reports from closely acquainted persons, as part of ongoing research in university student samples; for the present report, we combined these latter data as cumulated from 2007 up until the end of 2014.

Method

Participants and Procedures

Online Sample. Between October 19, 2014 and October 18, 2015, 104,467 individuals submitted responses on the self-report form of the English-language HEXACO-100 on a recently launched online survey site (http://hexaco.org). Of these, 100,639 participants responded to all of the 100 items and made correct responses to all of the three attentiveness-check items interspersed throughout the inventory (e.g., "This is an attentiveness check; please indicate 'neutral'"). The participants were further screened out on the basis of two additional checks for data quality. First, to screen out the respondents who provided extremely incoherent responses, we computed a standard deviation of the item responses on each of the six factor-level scales (i.e., after recoding of reverse-keyed items), and calculated for each respondent an average of the six standard deviations. Our

previous data from student samples suggested that it is extremely unlikely that a respondent will have a value of 1.60 or greater on this variable, and therefore, we excluded respondents according to this criterion. Second, to screen out persons who overused the same response option (or otherwise showed very little variation in use of response options), we computed for each respondent a standard deviation of responses on all HEXACO-100 items before recoding of reverse-keyed items. Our previous data from student samples suggested that it is extremely unlikely that a respondent will have a value of less than 0.70 on this variable, and therefore, we excluded respondents according to this criterion. After the application of these three screening criteria, a sample of 100,318 respondents remained.[1]

Of the 100,318 respondents included in the final online sample, 48.4% were female and 50.2% were male (the remaining 1.4% did not provide gender information). With regard to the age of participants, 1,373 participants did not indicate their age; of the remaining participants, the mean age was 37.1 years and the standard deviation was 14.1. A majority of the participants indicated their highest level of completed education as high school (19.2%), university/college (41.6%), or graduate/professional school (32.8%). Of those who indicated high school, 47% indicated that they are currently attending a postsecondary education.

Undergraduate Student Sample. In ongoing research since 2007, the HEXACO-100 has been administered to undergraduate students and their close acquaintances (typically friends, romantic partners, or relatives, with most of the acquaintances also being students). In this research, participants attended sessions in pairs of two closely acquainted persons, both of whom provided self-reports and observer reports of the other dyad member on the HEXACO-100. Participants completed the questionnaires in a small group setting (10 pairs or fewer), and participants were seated separately from (and were not permitted to communicate with) the other members of their respective pairs.

The final sample included 2,868 participants (hereafter the student sample); 64.3% were female and 34.9% were male (0.8% did not indicate their sex). The average age of the participants was 20.9 (SD = 3.9). The length of time that the participants indicated having known each other ranged from 6 months to 37 years (M = 5.0 years, SD = 4.7), and the median subjective rating as to how well they feel they know their participating partners was 8 on a scale from 0 to 10 (M = 8.1, SD = 1.4).

HEXACO-100. The paper-and-pencil format of the inventory was used for the student sample. Different subsets of student respondents also completed different sets of additional self-report survey materials. Participants provided self-reports on the HEXACO-100 (and other measures) first and then observer reports on the HEXACO-100 (and, in some cases, additional measures). For all HEXACO-100 items, a 1-to-5 response scale was used, with response options given as 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral (neither agree nor disagree)*, 4 = *agree*, and 5 = *strongly agree*. Within each facet-level scale, between one and three of the four items are reverse-scored; within each factor-level scale, between 7 and 10 of the 16 items are reverse-scored. A respondent's scale score is computed as the average of his or her responses across all items belonging to the scale, after recoding of reverse-scored items.

For the online questionnaire, the order of items was the same as that of the paper-and-pencil version; the items were presented one at a time, with the next item presented immediately after the participants submitted a response to an item. The three attentiveness-check items (see above) were inserted after Items 24, 49, and 74. After completing the HEXACO-100, the online participants were asked to answer optional research-related and demographic questions. Each online participant's HEXACO-100 scale scores were provided to that person along with some distributional data and some background information about personality measurement in the form of FAQs.

Results

Descriptive Statistics and Alpha Reliabilities

Table 1 shows means, standard deviations, and alpha reliabilities of the HEXACO-100 scales from the two samples. Alpha reliabilities of the self- and observer reports of the HEXACO-100 factor-level scales all fell in the .80s. At the facet level, alpha reliabilities of the self-report scales (in the order of the student and online samples) ranged from .52 and .59 for Unconventionality to .81 and .83 for Greed Avoidance, with a mean of .70 and .73. Alpha reliabilities of the observer report facet scales ranged from .45 (Unconventionality) to .82 (Fairness), with a mean of .72.

Table 1 also provides means and standard deviations for self- and observer report scales in the student sample and for the self-report scales in the online sample. The means and standard deviations are also reported separately for each sex within each sample, and d statistics indicate the sex differences in standardized units. Mean scale scores were in most cases fairly close to the scale midpoint of 3.0, but ranged as high as about 3.7 (for Openness in the online sample). Scale standard deviations were typically around 0.60 for factor-level scales and around 0.80 for facet-level scales, and thus equaled about 15% and 20%, respectively, of the possible range of scores (i.e., 4.0). Within the student sample, self-reports averaged slightly higher than did observer reports for Emotionality (d = 0.20) and Openness to Experience (d = 0.31), but observer reports averaged slightly higher than did self-reports for Agreeableness (d = 0.24).

With regard to the differences between the online and student samples (within self-report data), the former sample

Table 1. Means, Standard Deviations, and Alpha Reliabilities of the HEXACO-100 Scales.

	Student sample: Self-reports					Student sample: Observer reports					Online sample: Self-reports				
	Total (N = 2,868)		Women (N = 1,843)	Men (N = 1,001)	Sex diff.	Total (N = 2,863)		Women (N = 1,839)	Men (N = 1,000)	Sex diff.	Total (N = 100,318)		Women (N = 48,562)	Men (N = 50,397)	Sex diff.
	M (SD)	α	M (SD)	M (SD)	$d_{w\text{-}m}$	M (SD)	α	M (SD)	M (SD)	$d_{w\text{-}m}$	M (SD)	α	M (SD)	M (SD)	$d_{w\text{-}m}$
Factor-level scales															
Honesty–Humility	3.24 (0.60)	.82	3.34 (0.56)	3.06 (0.62)	0.49	3.22 (0.63)	.84	3.32 (0.60)	3.04 (0.64)	0.45	3.30 (0.74)	.89	3.45 (0.69)	3.15 (0.76)	0.42
Emotionality	3.42 (0.61)	.84	3.66 (0.50)	3.00 (0.57)	1.23	3.30 (0.61)	.83	3.54 (0.51)	2.87 (0.53)	1.28	3.12 (0.63)	.84	3.38 (0.56)	2.86 (0.58)	0.92
Extraversion	3.47 (0.58)	.85	3.46 (0.59)	3.51 (0.56)	−0.09	3.52 (0.59)	.88	3.50 (0.59)	3.55 (0.60)	−0.09	3.22 (0.64)	.86	3.21 (0.64)	3.23 (0.64)	−0.03
Agreeableness	2.97 (0.59)	.84	2.95 (0.58)	3.03 (0.60)	−0.13	3.12 (0.66)	.89	3.12 (0.65)	3.12 (0.67)	0.01	2.78 (0.63)	.86	2.78 (0.62)	2.78 (0.64)	0.01
Conscientiousness	3.45 (0.58)	.84	3.51 (0.56)	3.35 (0.59)	0.28	3.45 (0.63)	.89	3.55 (0.59)	3.27 (0.65)	0.46	3.52 (0.55)	.82	3.55 (0.55)	3.49 (0.56)	0.11
Openness	3.32 (0.61)	.81	3.31 (0.62)	3.34 (0.61)	−0.04	3.14 (0.62)	.82	3.15 (0.61)	3.11 (0.63)	0.07	3.69 (0.57)	.82	3.65 (0.60)	3.73 (0.55)	−0.14
Facet-level scales															
(Honesty–Humility)															
Sincerity	3.20 (0.77)	.66	3.21 (0.77)	3.18 (0.78)	0.05	3.16 (0.78)	.68	3.16 (0.78)	3.16 (0.78)	0.00	3.24 (0.91)	.78	3.31 (0.89)	3.17 (0.92)	0.16
Fairness	3.44 (0.95)	.76	3.63 (0.85)	3.08 (1.02)	0.59	3.43 (0.96)	.82	3.61 (0.89)	3.09 (1.0)	0.56	3.53 (1.06)	.83	3.73 (0.98)	3.33 (1.11)	0.39
Greed Avoidance	2.74 (0.93)	.81	2.81 (0.89)	2.60 (0.97)	0.22	2.74 (0.92)	.80	2.85 (0.89)	2.55 (0.94)	0.33	3.00 (1.01)	.83	3.11 (0.98)	2.88 (1.01)	0.24
Modesty	3.59 (0.75)	.68	3.71 (0.71)	3.37 (0.78)	0.47	3.56 (0.75)	.70	3.65 (0.71)	3.38 (0.78)	0.37	3.42 (0.87)	.79	3.63 (0.79)	3.22 (0.90)	0.49
(Emotionality)															
Fearfulness	3.11 (0.86)	.70	3.38 (0.78)	2.62 (0.81)	0.95	3.19 (0.83)	.70	3.48 (0.73)	2.67 (0.76)	1.08	2.81 (0.84)	.70	3.12 (0.80)	2.52 (0.77)	0.76
Anxiety	3.70 (0.78)	.64	3.88 (0.68)	3.36 (0.84)	0.68	3.33 (0.77)	.66	3.51 (0.72)	2.99 (0.76)	0.71	3.54 (0.86)	.73	3.76 (0.79)	3.32 (0.87)	0.53
Dependence	3.32 (0.91)	.80	3.55 (0.85)	2.90 (0.86)	0.75	3.28 (0.83)	.74	3.51 (0.76)	2.86 (0.80)	0.83	2.84 (0.88)	.76	3.08 (0.87)	2.61 (0.83)	0.55
Sentimentality	3.57 (0.79)	.70	3.82 (0.69)	3.12 (0.76)	0.96	3.41 (0.78)	.73	3.65 (0.70)	2.97 (0.71)	0.97	3.28 (0.85)	.73	3.58 (0.78)	2.99 (0.81)	0.74
(Extraversion)															
Social Self-Esteem	3.81 (0.68)	.67	3.78 (0.68)	3.85 (0.68)	−0.09	3.82 (0.63)	.69	3.81 (0.63)	3.85 (0.65)	−0.06	3.56 (0.77)	.70	3.51 (0.76)	3.61 (0.76)	−0.13
Social Boldness	2.99 (0.88)	.76	2.91 (0.90)	3.15 (0.82)	−0.27	3.08 (0.88)	.78	3.00 (0.89)	3.22 (0.84)	−0.26	3.05 (0.87)	.72	2.99 (0.88)	3.10 (0.86)	−0.12
Sociability	3.58 (0.78)	.71	3.60 (0.78)	3.54 (0.77)	0.07	3.57 (0.81)	.77	3.57 (0.80)	3.56 (0.83)	0.01	3.02 (0.88)	.77	3.07 (0.89)	2.97 (0.87)	0.11
Liveliness	3.52 (0.76)	.76	3.53 (0.76)	3.50 (0.76)	0.04	3.61 (0.74)	.76	3.62 (0.74)	3.59 (0.73)	0.05	3.26 (0.83)	.78	3.28 (0.83)	3.24 (0.84)	0.05
(Agreeableness)															
Forgivingness	2.75 (0.82)	.74	2.71 (0.80)	2.82 (0.84)	−0.13	2.86 (0.78)	.69	2.83 (0.76)	2.92 (0.80)	−0.12	2.42 (0.83)	.78	2.42 (0.81)	2.41 (0.84)	0.01
Gentleness	3.22 (0.72)	.66	3.21 (0.71)	3.22 (0.74)	−0.01	3.35 (0.81)	.78	3.34 (0.80)	3.36 (0.84)	−0.02	2.95 (0.81)	.72	2.99 (0.79)	2.92 (0.82)	0.09
Flexibility	2.79 (0.74)	.61	2.78 (0.74)	2.81 (0.73)	−0.04	2.95 (0.87)	.77	2.99 (0.85)	2.86 (0.88)	0.15	2.71 (0.75)	.64	2.75 (0.74)	2.68 (0.75)	0.09
Patience	3.15 (0.88)	.79	3.09 (0.86)	3.26 (0.92)	−0.19	3.34 (0.84)	.76	3.33 (0.81)	3.34 (0.89)	0.00	3.04 (0.90)	.80	2.97 (0.87)	3.10 (0.92)	−0.14
(Conscientiousness)															
Organization	3.28 (0.93)	.74	3.34 (0.94)	3.16 (0.91)	0.20	3.33 (0.91)	.77	3.44 (0.90)	3.13 (0.91)	0.34	3.36 (0.88)	.73	3.45 (0.89)	3.27 (0.86)	0.21
Diligence	3.79 (0.69)	.70	3.84 (0.68)	3.69 (0.71)	0.21	3.80 (0.74)	.76	3.87 (0.70)	3.66 (0.79)	0.29	3.79 (0.73)	.71	3.81 (0.72)	3.77 (0.74)	0.06
Perfectionism	3.53 (0.77)	.69	3.60 (0.76)	3.39 (0.78)	0.27	3.45 (0.81)	.79	3.60 (0.75)	3.20 (0.84)	0.50	3.55 (0.76)	.69	3.59 (0.74)	3.51 (0.77)	0.12
Prudence	3.20 (0.74)	.69	3.24 (0.71)	3.13 (0.78)	0.15	3.23 (0.78)	.72	3.31 (0.75)	3.09 (0.81)	0.27	3.40 (0.75)	.70	3.36 (0.74)	3.44 (0.75)	−0.10
(Openness to Experience)															
Aesthetic Appreciation	3.27 (0.89)	.66	3.38 (0.86)	3.08 (0.92)	0.34	3.01 (0.90)	.68	3.13 (0.87)	2.79 (0.91)	0.37	3.52 (0.82)	.65	3.64 (0.80)	3.41 (0.83)	0.29
Inquisitiveness	3.09 (0.91)	.66	2.97 (0.89)	3.30 (0.89)	−0.36	2.91 (0.88)	.65	2.80 (0.85)	3.11 (0.89)	−0.35	3.84 (0.80)	.70	3.64 (0.84)	4.04 (0.71)	−0.52
Creativity	3.53 (0.90)	.75	3.54 (0.91)	3.50 (0.88)	0.04	3.47 (0.84)	.73	3.55 (0.83)	3.32 (0.85)	0.28	3.72 (0.84)	.73	3.72 (0.86)	3.72 (0.82)	0.00
Unconventionality	3.40 (0.65)	.52	3.36 (0.64)	3.48 (0.66)	−0.19	3.16 (0.66)	.45	3.12 (0.63)	3.21 (0.69)	−0.13	3.69 (0.67)	.59	3.61 (0.68)	3.76 (0.66)	−0.22
(Interstitial Scale)															
Altruism	3.89 (0.66)	.59	4.03 (0.60)	3.62 (0.68)	0.64	3.79 (0.68)	.62	3.89 (0.65)	3.61 (0.70)	0.43	3.76 (0.74)	.66	3.97 (0.66)	3.56 (0.75)	0.57

showed higher scores for Openness ($d = 0.62$), but the latter showed higher scores for Emotionality ($d = 0.50$), Extraversion ($d = 0.42$), and Agreeableness ($d = 0.32$). Such differences may reflect a combination of some demographic differences between the two samples, such as their mean age and sex composition, as well as true personality differences and response style differences; however, detailed consideration of the sources of these score differences is beyond the scope of this article.

Consistent with the findings of previous studies, appreciable gender differences were found for self-reports on Honesty–Humility (women higher than men, with ds = 0.49 and 0.42 for the student and online samples, respectively) and Emotionality (women higher than men, with ds = 1.23 and 0.92 for the student and online samples, respectively) as well as, in the student sample, observer reports on Honesty–Humility ($d = 0.45$) and on Emotionality ($d = 1.28$).

Factor Structure of the HEXACO-100

Within each sample, we conducted principal components analyses both at the facet level (with the aim of recovering the six broad factors) and at the item level (with the aim of recovering the 25 narrower facets). With regard to the latter analyses, we are not aware of any previous studies in which the items of an omnibus personality inventory have been analyzed with the aim of recovering separate factors for each of the facets of the inventory.

Facet-Level Analysis. Three principal components analyses involving the 25 facet scales were conducted: self-reports from the student sample, observer reports from the student sample, and self-reports from the online sample. (The correlation matrices for the three data sets are shown in Supplementary Tables 1-3; all supplementary materials available online at http://asm.sagepub.com/content/by/supplemental-data.) The scree plots of eigenvalues in all three data sets clearly suggested a break between the seventh and sixth dimensions (see Figure 1). Table 2 shows the results of the six-component solution after varimax rotation as obtained in each of the three data sets. Within each analysis, all of the 24 facets that are assigned to a single dimension showed their highest loadings on their designated components. As expected, the Altruism scale divided its loadings on Honesty–Humility, Emotionality, and Agreeableness in all three analyses, with loadings in the .30s and .40s on those dimensions. We should also note that many of the other 24 facet scales showed one or more appreciable and theoretically meaningful secondary loadings. As seen in Table 2, the pattern of secondary loadings was found to be very similar across three analyses.

Item-Level Analysis. We conducted a principal components analysis at the item level separately for each of the three data sets. The scree plots obtained from the two self-report samples showed a clear elbow after the first seven factors, whereas the scree plot from observer report sample showed it after the first six factors.[2]

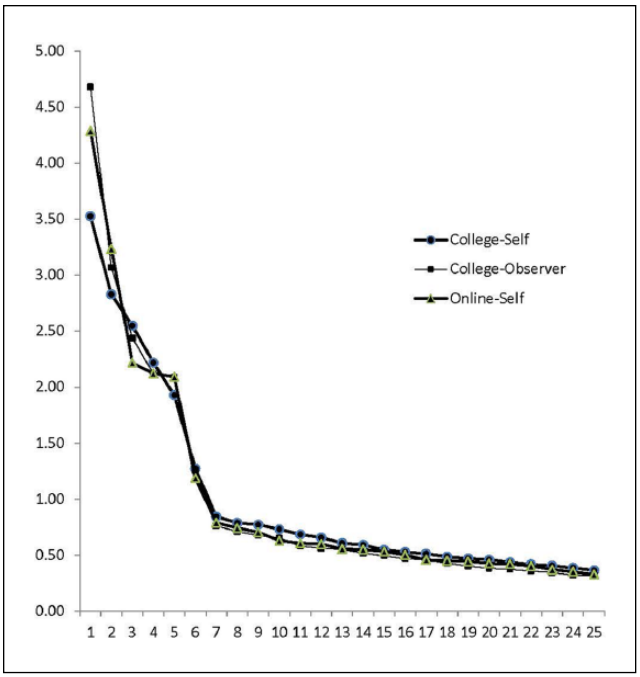

Figure 1. Eigenvalues from the three principal components analyses.

Given that the primary purpose of the item-level analyses was to assess the empirical distinctness of the 25 facet scales in the HEXACO-100, we first rotated the 25 components using the varimax criterion. In these varimax-rotated solutions, the large majority of the 25 components were defined primarily by the designated items, but a few components were jointly defined by items from two facets in the same factor domain. We then rotated the 25 compon-ents using the orthogonal Procrustes–targeted rotation (Paunonen, 1997; Schönemann, 1966), with the four items of each facet being targeted on their own component. The Procrustes-rotated solutions produced components that corresponded very closely to the 25 facets (see Supplementary Tables 4-6): In the two self-report data sets, all 100 items showed their strongest loadings on their intended components, typically ranging from the .50s to the .70s. The average loadings shown by the constituent items of the facets on their intended components ranged from .49 (Altruism) to .73 (Greed Avoidance) in the online sample, and from .50 (Altruism) to .74 (Greed Avoidance) in the student sample. In observer report data, 97 of 100 items showed their highest loadings on the intended components; one item in Unconventionality and two items in Altruism showed their highest loadings on other components. The average loadings of the constituent items for the 25 facets in observer reports ranged from .50 (Altruism) to .74 (Greed Avoidance). The item-level principal components analyses therefore support the distinctness of the 25 facet scales.

Table 2. Loadings of HEXACO-100 Facet Scales on Six Varimax-Rotated Components.

	Honesty–Humility			Emotionality			Extraversion			Agreeableness			Conscientiousness			Openness to Experience		
	St: Self	St: Obs.	On: Self	St: Self	St: Obs.	On: Self	St: Self	St: Obs.	On: Self	St: Self	St: Obs.	On: Self	St: Self	St: Obs.	On: Self	St: Self	St: Obs.	On: Self
Sincerity	**.72**	**.73**	**.78**	−.15	−.17	−.04	.02	−.08	−.05	.00	.06	.04	.09	.11	.05	−.01	.04	.03
Fairness	**.64**	**.67**	**.68**	.21	.19	.17	−.03	.04	.10	.11	.13	.17	**.30**	**.31**	.27	.00	.03	.02
Greed Avoidance	**.67**	**.72**	**.75**	−.02	.02	−.02	−.10	−.07	−.08	.16	.13	.18	−.07	.00	−.04	.24	.21	.13
Modesty	**.65**	**.65**	**.70**	.20	.16	.20	−.09	.02	−.11	.21	**.36**	**.32**	−.08	.00	−.05	−.06	.00	−.06
Fearfulness	−.10	−.06	.01	**.67**	**.68**	**.64**	−.24	−.21	−.27	.02	.04	.04	.14	.18	.05	−.17	−.14	−.20
Anxiety	.02	−.02	−.06	**.57**	**.65**	**.64**	**−.35**	**−.31**	**−.42**	−.28	−.16	−.21	.15	.24	.08	.05	.08	.03
Dependence	−.01	.02	.01	**.75**	**.79**	**.75**	.10	.11	.12	−.08	−.06	−.04	−.04	−.05	−.13	−.03	.03	−.03
Sentimentality	.19	.21	.28	**.78**	**.78**	**.74**	.13	.13	.09	.02	.10	.10	.00	.04	−.02	.02	.11	.09
Social Self-Esteem	−.06	−.02	.01	−.09	−.16	−.22	**.71**	**.73**	**.71**	.11	.10	.15	.23	.18	.21	−.07	−.11	−.03
Social Boldness	−.06	−.06	−.09	−.16	−.16	−.07	**.70**	**.75**	**.74**	−.17	−.16	−.17	.06	−.02	.00	.19	.20	.19
Sociability	−.06	−.07	−.11	.26	.18	**.32**	**.70**	**.79**	**.72**	.05	.10	.12	−.06	−.13	−.12	−.03	.04	.02
Liveliness	.02	.06	.05	.01	.03	−.06	**.78**	**.76**	**.79**	.20	.25	.19	.05	.04	.13	−.02	.06	.01
Forgivingness	.21	.09	.27	−.09	−.09	.00	.18	.11	.18	**.61**	**.74**	**.63**	.02	−.01	−.08	.07	.10	.08
Gentleness	.18	.21	.22	.06	.03	.09	.05	.09	.00	**.73**	**.77**	**.76**	−.04	−.03	−.10	.03	.06	.03
Flexibility	.00	.14	.15	.04	.07	.08	−.05	−.01	.06	**.74**	**.78**	**.74**	−.02	−.01	.03	−.02	.01	−.01
Patience	.07	.10	.03	−.13	−.06	−.21	.06	.06	.03	**.78**	**.81**	**.78**	.11	.14	.13	.07	.04	.07
Organization	−.01	.00	.03	.06	.08	.01	.11	−.01	.15	.05	.05	.00	**.69**	**.74**	**.69**	−.12	−.07	−.19
Diligence	.11	.15	.06	.03	.08	−.02	**.32**	**.30**	**.37**	−.10	−.04	−.07	**.71**	**.72**	**.65**	.13	.16	.19
Perfectionism	.06	.07	.01	.14	.19	.14	.00	−.02	−.15	−.12	−.07	−.12	**.74**	**.80**	**.69**	.12	.15	.15
Prudence	.04	.17	.08	−.04	−.05	−.21	−.10	−.12	−.03	.19	.15	.17	**.74**	**.75**	**.73**	−.04	−.04	−.02
Aesthetic Appreciation	.11	.15	.17	.13	.17	.15	−.09	−.08	−.02	.08	.13	.13	.07	.11	.09	**.79**	**.78**	**.71**
Inquisitiveness	.01	.04	.03	−.21	−.23	−.24	−.08	.00	.02	.06	.02	.02	.12	.20	.13	**.64**	**.70**	**.64**
Creativity	.06	.13	.03	.09	.18	.08	.18	.17	.16	.02	.06	.02	−.07	−.07	−.03	**.70**	**.68**	**.73**
Unconventionality	−.02	.00	−.04	−.09	−.03	−.06	.03	.07	.01	−.02	.03	.00	−.06	−.06	−.11	**.76**	**.77**	**.78**
Altruism	**.37**	**.45**	**.46**	**.49**	**.38**	**.47**	.22	.21	.20	.27	**.41**	**.37**	.17	.14	.08	.13	.15	.15

Note. St: Self = Student sample: Self-reports (N = 2,868); St: Obs. = Student sample: Observer reports (N = 2,863); On: Self = Online sample: Self-reports (N = 100,318). Absolute factor loadings that are greater than .30 are shown in bold; see text for expected loadings of Altruism facet.

Table 3. Correlations Among the HEXACO-100 Factor Scales.

	1	2	3	4	5	6
Student sample: Self-reports (*N* = 2,868)						
1. Honesty–Humility	1.00					
2. Emotionality	.13	1.00				
3. Extraversion	−.08	−.10	1.00			
4. Agreeableness	.30	−.14	.13	1.00		
5. Conscientiousness	.15	.13	.17	.06	1.00	
6. Openness	.14	−.07	.05	.10	.04	1.00
Student sample: Observer reports (*N* = 2,863)						
1. Honesty–Humility	1.00					
2. Emotionality	.15	1.00				
3. Extraversion	−.02	−.11	1.00			
4. Agreeableness	.39	−.02	.15	1.00		
5. Conscientiousness	.27	.22	.04	.09	1.00	
6. Openness	.24	.07	.13	.15	.14	1.00
Online sample: Self-reports (*N* = 100,318)						
1. Honesty–Humility	1.00					
2. Emotionality	.17	1.00				
3. Extraversion	−.03	−.16	1.00			
4. Agreeableness	.42	−.05	.17	1.00		
5. Conscientiousness	.14	−.06	.17	.03	1.00	
6. Openness	.12	−.05	.13	.12	.07	1.00
Online sample: Excluding media-directed respondents (*N* = 8,233)						
1. Honesty–Humility	1.00					
2. Emotionality	.11	1.00				
3. Extraversion	−.05	−.12	1.00			
4. Agreeableness	.28	−.17	.20	1.00		
5. Conscientiousness	.17	−.05	.15	.02	1.00	
6. Openness	.16	−.08	.08	.11	.04	1.00

Table 4. Self/Observer Agreement for HEXACO-100 Factor and Facet Scales.

	r		*r*
Honesty–Humility	.46	Agreeableness	.47
Sincerity	.20	Forgivingness	.35
Fairness	.45	Gentleness	.35
Greed Avoidance	.47	Flexibility	.35
Modesty	.30	Patience	.43
Mean WFCC/mean WFDC	.36/.19	*Mean WFCC/mean WFDC*	.37/.25
Emotionality	.61	Conscientiousness	.52
Fearfulness	.51	Organization	.52
Anxiety	.40	Diligence	.37
Dependence	.44	Perfectionism	.42
Sentimentality	.47	Prudence	.33
Mean WFCC/mean WFDC	.46/.30	*Mean WFCC/mean WFDC*	.41/.25
Extraversion	.56	Openness to Experience	.56
Social Self-Esteem	.38	Aesthetic Appreciation	.49
Social Boldness	.53	Inquisitiveness	.45
Sociability	.45	Creativity	.50
Liveliness	.45	Unconventionality	.36
Mean WFCC/mean WFDC	.45/.28	*Mean WFCC/mean WFDC*	.45/.26
Interstitial facet			
Altruism	.36		

Note. N = 2,863. WFCC = within-factor convergent correlation (self/observer correlation for same facet scale); WFDC = within-factor discriminant correlation (self/observer correlation for different facet scales within same factor).

Correlations Between the HEXACO Factor Scales

Consistent with the findings from previous studies, the correlations between the HEXACO factor scales were generally low (see Table 3). Within the student sample, the strongest correlation was that between Honesty–Humility and Agreeableness, both in self-reports (r = .30) and in observer reports (r = .39). In self-reports from the student sample, no other correlation between factor scales had an absolute value exceeding .20. With respect to observer reports in the student sample, three other correlations had absolute values exceeding .20, but none reaching .30. In the online sample (based on self-reports), the highest correlation was again that between Honesty–Humility and Agreeableness (r = .42); all other correlations had absolute values below .20. Interestingly, the correlation between Honesty–Humility and Agreeableness in the online sample was found to be noticeably higher than that in the student sample self-reports (.42 vs. .30).

One possible reason for the difference in correlations involves the way by which many of the online participants found the HEXACO website. Many of the early participants in the online sample had likely visited the HEXACO-PI-R website with an intrinsic interest in learning about their personality profile. However, beginning on June 9, 2014, an article about Machiavellianism appeared in a popular science magazine, and that article included a link to the online HEXACO-PI-R. Shortly thereafter, several online newspapers, including mass-market tabloids, published articles with eye-catching headlines (e.g., *How Machiavellian Are You?*) and links to the online HEXACO-PI-R. Such publicity resulted in a massive influx of persons who provided self-reports on the HEXACO-100: about 78,129 persons responded during the 2 weeks from June 9 to June 23. Given the results reported elsewhere in this article, it appears that this influx of respondents did not in general compromise the psychometric properties of the HEXACO-100. However, the participants who responded on or after June 9 differed from those who responded before that date. Specifically, the "posttabloid article" participants tended to show lower means than the earlier participants in Honesty–Humility (d = −0.23), Agreeableness (d = −0.37), and Openness to Experience (d = −0.16), as well as a higher standard deviation in Honesty–Humility (by 10%) and lower standard deviations in Extraversion (by 10%) and Conscientiousness (by 7%).[3] Also, the correlations between Honesty–Humility facets, and the correlation between Honesty–Humility and Agreeableness, were clearly higher among the later participants. When we calculated the correlations among the HEXACO factor scales using only the sample of 8,233 respondents who completed the inventory before the massive influx of the media-directed respondents (see Table 3), the correlation between Honesty–Humility and Agreeableness was only .28, which is very similar to what was observed in the student self-report data. The correlation between self-reports of Honesty–Humility and Agreeableness was thus around .30 for the online pretabloid article participants and the student participants, but increased to around .40 for online participants who mainly

were attracted by tabloid newspaper articles about assessing one's manipulative tendencies.[4] In the Discussion section, we consider explanations for the increased correlation within the latter group of participants.

Self/Observer Agreement

The student sample includes 2,863 pairs of well-acquainted persons who provided self- and observer reports on the HEXACO-100, and we examined self/observer agreement in the HEXACO-100 variables among these persons.[5] As shown in Table 4, the self/observer agreement correlations for the factor scales were .61 for Emotionality, .56 for Extraversion and Openness to Experience, .52 for Conscientiousness, .47 for Agreeableness, and .46 for Honesty–Humility. In contrast, the self/observer discriminant correlations between factor scales all fell below .20 except for that between self-report Emotionality and observer report Conscientiousness (r = .20). Table 4 also shows self/observer agreement correlations for the 25 facet scales. These values ranged from .20 (Sincerity) to .53 (Social Boldness) with a mean of .42. Note that the Sincerity scale showed a noticeably lower agreement relative to other facet scales, as the next two lowest self/observer agreement correlations were .30 and .33, for Modesty and Prudence, respectively. In the Discussion section, we comment further on the findings for Sincerity.

The mean of self/observer agreement correlations for facets within the same factor (referred as mean within-factor convergent correlation) were much stronger than the mean self/observer correlations between different facets in the same factor (referred as mean within-factor discriminant correlation), a finding that supports the empirical distinctness of the facets within the same factor. (The self/observer correlations between different facets from the different factor domains—that is, cross-factor discriminant correlations—were expectedly lower than were within-factor discriminant correlations, with a mean absolute correlation of .07.)

Discussion

Summary of Results

In this report, we examined the psychometric properties of self- and observer report forms of the HEXACO-100 using two large data sets, one of which includes data consisting of reciprocal self- and observer reports in close acquaintances. The results showed that across data sets and sources, the scales showed appropriate score distributions, with mean scores not far from scale midpoints and with the standard deviations about 15% (factor scales) or 20% (facet scales) of the possible range of scores. Alpha reliabilities were in the .80s for factor-level scales and averaged above .70 for the facet-level scales. Principal components analyses of the 25 facet-level scales produced six components that were clearly interpretable as the HEXACO dimensions; also, principal components analyses of the 100 items produced 25 components that corresponded quite closely to the facets. Self/observer agreement between closely acquainted persons averaged in the .50s for factor-level scales and above .40 for the facet-level scales; moreover, self/observer correlations for the same facet averaged at least 50% higher than self/observer correlations for different facets from the same factor-level scale. Thus, the results supported the construct validity of both factor- and facet-level scales in the HEXACO-100. Below, we discuss some of the results in detail.

Alpha Reliabilities

As noted above, we obtained alpha reliabilities in the .80s for the factor-level scales and averaging above .70 (but ranging from the .50s to the .80s) for the facet-level scales. It is sometimes claimed, without explanation, that an alpha of .70 represents a minimally acceptable level of alpha reliability. We note, however, for the brief (four-item) facet-level scales of the HEXACO-100, even a moderately high mean interitem correlation of .30 would produce an alpha reliability of only .63.[6] In our opinion, it would be unwise to achieve an arbitrarily determined level of alpha reliability by (a) making the items very similar, with corresponding loss of content validity or (b) exploiting response style variance (such as by excluding reverse-scored items and/or by making items more extreme in social desirability), thereby weakening the discriminant validity of the scales (see Ashton et al., in press).

We think that even the HEXACO-100 facets having relatively low reliability are useful for research purposes, given the evidence of their convergent and discriminant validity as shown in Table 4. In a similar way, McCrae, Kurtz, Yamagata, and Terracciano (2011) have demonstrated that for the NEO-PI-R, facet scales with lower alpha reliability (i.e., $\alpha < .60$) tend to show similar levels of validity to those of other facet scales with higher alpha reliability. However, because of the brevity of the HEXACO-100 facet scales, a considerable fraction of the scale variance will be attributable to the individual items; therefore, we recommend that researchers who examine the associations of these scales with various external criteria also check the item-level associations with those criteria, to ensure that the facet-level associations are not due to the variance of a particular item.

Correlations Between the HEXACO Factor-Level Scales

As with the findings from the previous studies (e.g., Ashton, Lee, Goldberg, & de Vries, 2009), the correlations between the HEXACO factor scales were found to be much lower than what has typically been observed for Big Five measures. Within self-report data, an absolute correlation exceeding .20

was observed for only one pair of scales, Honesty–Humility and Agreeableness. In contrast, correlations between self-report scales measuring the Big Five are typically much higher, with about half of the 10 scale intercorrelations falling between .20 and .40 (or higher) for widely used Big Five measures such as the NEO Five-Factor Inventory and the NEO-PI-R (Costa & McCrae, 1992), the Big Five Inventory (John & Srivastava, 1999), and the Big Five Aspect Scales (DeYoung, Quilty, & Peterson, 2007). (See, e.g., Table 2 in Lee & Ashton, 2013; Table 6 in DeYoung et al., 2007; Appendix F in Costa & McCrae, 1992.) We note that the relatively weak correlations between HEXACO-100 factor-level scales, as compared with the correlations between Big Five scales, would leave little room for any higher-order factor(s) of considerable size, regardless of whether such factors were to reflect real personality variation or merely response biases (see Ashton et al., 2009, for a discussion of higher-order personality factors).

Within observer report data, correlations between factor-level scales tended to be higher than in self-reports but were still modest, with only one correlation in the .30s, and three in the .20s. The higher correlations in observer report data are consistent with previous results suggesting that observer reports of personality provide a less differentiated description than do self-reports (e.g., Ashton & Lee, 2010; Beer & Watson, 2008).

In each of our samples, the highest correlating pair of factor-level scales was Honesty–Humility and Agree-ableness. We believe that the modest positive correlation between these two scales can be understood in relation to our interpretation of their underlying dimensions as representing the personality bases of reciprocally altruistic tendencies (e.g., Ashton & Lee, 2007). That is, although Honesty–Humility and Agreeableness represent two different forms of reciprocal-altruistic tendencies, the combination of high Honesty–Humility and high Agreeableness (vs. low Honesty–Humility and low Agreeableness) is of particular importance in everyday interactions with others because it is this blend that determines an overall tendency to cooperate with (vs. defect against) others. For this reason, coherent personality traits (or single personality descriptors) tend to be densely located in this region, whereas opposite-signed blends are scarce. As a result, measures of Honesty–Humility and Agreeableness tend to be modestly positively correlated (see detailed discussion in Ashton, Lee, & de Vries, 2014). But even for Honesty–Humility and Agreeableness, some of the correlations between facets are only slightly above zero: in the most extreme case, the Sincerity facet of Honesty–Humility correlated only .10, .15, and .11 with the Patience facet of Agreeableness in the student self-report, student observer report, and online self-report data sets, respectively (with the last value dropping to only .07 if based only on the "pretabloid" respondents).

As noted in the Results section, the correlation between Honesty–Humility and Agreeableness was noticeably higher ($r = .42$) when calculated from the sample of respondents who were mostly attracted through tabloid newspaper articles describing Machiavellian tendencies. Although a detailed analysis of the reason for this relatively high correlation is beyond the scope of this article, we suspect that it resulted partly from increased variance among the "posttabloid" respondents in an underlying Honesty–Humility factor. That is, the tabloid articles could have increased the variance in an underlying Honesty–Humility factor, both by attracting more respondents with lower levels of Honesty–Humility and also by priming respondents to choose consistently high- or low-Honesty-Humility response options. To the extent that the variance in an underlying Agreeableness factor was not increased, and to the extent that Agreeableness facets tend to have modest positive secondary loadings on the underlying Honesty–Humility factor, increased variance in the latter factor would also increase the proportion of Agreeableness scale variance that overlaps with Honesty–Humility.

Self/Observer Agreement of the Factor-Level Scales

As we have reported elsewhere for subsamples of the current sample, the levels of self/observer agreement of the HEXACO-100 scales are rather high, ranging from the middle .40s to the low .60s. It is of some interest that the two factor-level scales having self/observer correlations below .50—Honesty–Humility and Agreeableness—are those that we interpret as being relevant to reciprocal-altruistic or cooperative tendencies. We suspect that observer reports on these dimensions will tend to be influenced by the current level of harmony or conflict in the relationship between the observer and the target person, and thus will often tend to overestimate or underestimate the target person's levels of these dimensions. This possibility is consistent with the finding that the correlations between these two scales are higher within observer reports than within self-reports, but we cannot test this possibility directly in the current data.

Self/observer agreement for the HEXACO-PI-R scales is typically slightly higher than is found for Big Five or FFM scales of comparable length (see, e.g., Lee & Ashton, 2013). This fact, in combination with the typically lower scale intercorrelations within each source, means that self-reports on HEXACO-PI-R scales are able to equal self-reports on Big Five scales in the prediction of observer reports on the latter, whereas self-reports on HEXACO-PI-R scales substantially exceed self-reports on Big Five scales in the prediction of observer reports on the former. Such results imply that measures of the HEXACO factors capture essentially all of the valid variance in measures of the Big Five, but that measures of the Big Five miss much of the valid variance in measures of the HEXACO factors.

Distinctness of the Facet-Level Scales

Many omnibus personality inventories are organized hierarchically such that many narrow facet scales are subsumed in

a few broad factors (e.g., the NEO-PI-R; Costa & McCrae, 1992). The factor structure of these personality inventories has frequently been examined through analyses in which the few broad factors are extracted from the facet scales (or occasionally, from the items), but never through analyses in which the many narrower facet-level factors are extracted from items. That is, the conceptualized differences among the facet scales have been assumed, but have not been empirically evaluated.

In the present research, we conducted a principal components analysis involving 100 items and examined 25 components defined by those items. The 25 components rotated to a predetermined target structure showed a fairly close correspondence to that target structure. That is, nearly all of the components were loaded most strongly by the four items making up the facet scale. These results were recovered across online and student samples as well as across self- and observer reports within the latter sample, and thereby strongly support the empirical distinctness of the HEXACO-100 facet scales.

In addition, results involving self/observer correlations also support the empirical distinctness of the facet scales. When we compare convergent correlations of facet scales (i.e., self/observer agreement) with the "semidiscriminant" correlations between facet scales within the same factor, no convergent correlation other than that of the Sincerity facet was exceeded by any of the within-factor discriminant correlations, and even Sincerity had a convergent correlation exceeding its own semidiscriminant correlations. (Low cross-source agreement has previously been observed for other personality traits involving interpersonal manipulation [e.g., "social adroitness"; Jackson, 1978], and this suggests that even closely acquainted individuals have somewhat limited accuracy in judging this aspect of each other's personalities.) Likewise, the mean within-factor convergent correlations were at least 50% larger than the mean within-factor discriminant correlations. These results thus support the conceptual distinctness of the HEXACO-100 facet scales.

One potential explanation for the variation across facet scales in self/observer agreement correlations is that the scales are differentially influenced by socially desirable responding. Recent analyses by de Vries, Realo, and Allik (2016) showed that across HEXACO items, self/observer agreement showed a modest negative correlation with the absolute value of item evaluativeness ($r = -.21$), and thus suggest at least some role of scale (un)desirability in self/observer agreement.

Relations With the HEXACO-60 and HEXACO-200

The HEXACO-60 has been described elsewhere (Ashton & Lee, 2009). We recommend this shorter version of the inventory (i.e., 10 items for each scale) for research in which time constraints do not allow administration of the HEXACO-100. The HEXACO-60, whose items are a subset of the HEXACO-100 (but not simply the first 60 such items), shows very high correlations at the factor-scale level with the HEXACO-100: in the present online sample, all six convergent correlations exceeded .95. When we compute the convergent correlations of the HEXACO-60 scales with the corresponding ad hoc scales consisting of the remaining six items from the HEXACO-100, the convergent correlations ranged from .67 (Conscientiousness) to .81 (Honesty–Humility) with a mean of .74 (see Supplementary Table 7 for the full results).

The present findings support the validity of the HEXACO-100 facet scales, and as explained earlier, we recommend this inventory for many contexts in which researchers are interested in facet-level as well as factor-level measurement. To examine the relationships of the facet scales of the HEXACO-100 with the corresponding longer scales of the HEXACO-200, we computed convergent correlations using a previously collected self-report data set in which the latter inventory was administered ($N = 877$ undergraduate students). The convergent correlations between the two sets of facet scales ranged from .90 (Unconventionality) to .96 (Organization). We also computed the correlations of the HEXACO-100 facet scales with the corresponding alternative facet scales comprising the four items from the HEXACO-200 not chosen for the HEXACO-100. The convergent correlations ranged from .58 (Creativity) to .83 (Organization) with a mean of .70 (see Supplementary Table 8 for the full results). These results suggest that the HEXACO-100 is adequate for facet- and factor-level assessments for research purposes. The HEXACO-200 is preferable when the researcher wants to measure the facets with high reliability and when a long administration time is available. This would be the case in some applied contexts and in pure research focusing on various specific facets.

Finally, we should note that the Altruism scale that is located interstitially among Honesty–Humility, Emotionality, and Agreeableness is not included in the HEXACO-60. Researchers who wish to use the HEXACO-60 but who are interested in measuring this aspect of personality are advised to add the items of the four-item Altruism scale included in the HEXACO-100.

Other Inventories Measuring Similar Sets of Six Personality Factors

There are currently some other measures of six factors similar to those of the HEXACO-PI-R. The Brief HEXACO Inventory (de Vries, 2013) has been developed with the express aim of providing a shorter measure of the six HEXACO constructs. The 24-item Brief HEXACO Inventory was found to show strong psychometric properties for such a brief instrument, including an adequate factor structure as well as good convergent validity with the personality dimensions included in the original HEXACO-PI-R. This instrument is suitable when

administration time is extremely limited but approximate indications of the broad factors are satisfactory.

Thalmayer, Saucier, and Eigenhuis (2011) developed the Questionnaire Big Six Scale (QB6) to operationalize the lexical six factors that are broadly similar to the six HEXACO constructs. A recent report by Thielmann, Hilbig, Zettler, and Moshagen (2016) showed that the six factors assessed by the QB6 and the HEXACO-60 were broadly similar to each other. The factor similarities were higher for Emotionality, Extraversion, Agreeableness, and Conscientiousness (rs >|.63|) than for Honesty–Humility and Openness to Experience (rs <|.46|). The QB6 appears to be a psychometrically sound short measure, but researchers should note the conceptual differences between the two models in relation to the latter two personality dimensions.

Finally, there is a measure known as the Mini-IPIP6 (Sibley et al., 2011), which adds an Honesty–Humility scale to the Mini-IPIP5 previously developed by Donnellan, Oswald, Baird, and Lucas (2006) to measure the classic Big Five. We should note that the factors assessed by the Mini-IPIP6 are not isomorphic to the six HEXACO constructs. First, Agreeableness and Neuroticism of the Mini-IPIP6 are two of the Big Five factors, and therefore, do not align directly with Agreeableness and Emotionality in the HEXACO model. In addition, the Honesty–Humility scale included in the Mini-IPIP6 is fairly narrow in that it includes only "humility" aspects (greed avoidance and modesty) and not "honesty" aspects (sincerity and fairness). The Mini-IPIP6 appears to be a psychometrically sound short measure, but researchers should note these differences between the constructs it assesses and those assessed by the HEXACO-PI-R.

Future Research Directions

Below, we discuss some future research directions. First, no studies yet have been conducted to examine to the extent that psychometric properties of the HEXACO-PI-R generalize across various demographic groups (e.g., sex, age, nationality, etc.), across rating conditions (e.g., supervised face-to-face administration vs. unsupervised online administration, or low-stakes research conditions vs. high-stakes job application conditions, etc.), and across different language versions. As such, investigating measurement invariance issues would be desirable. Exploratory structural equation modeling might be particularly useful for this purpose (see Marsh, Morin, Parker, & Kaur, 2014). Second, in the years to come, we may attempt to improve the validity of the inventory by identifying and replacing items that are culturally less generalizable or are outdated. Third, it is important to continue to assess to what extent and in what ways the HEXACO-PI-R can add to personality inventories widely used in the literature. Although studies have shown that the Honesty–Humility, Emotionality, and Agreeableness dimensions contain much valid variance not captured by the Big Five factors (e.g., Lee & Ashton, 2013), it is of interest to identify important criterion variables and personality phenomena (e.g., age trends, similarity between social partners, etc.) that are associated with that variance. Thus far, such studies have been primarily focusing on the Honesty–Humility dimension (Ashton & Lee, 2008; Hilbig & Zettler, 2015), with some attention to Emotionality (Ashton et al., 2008; Gaughan et al., 2012), but future research might examine Emotionality and Agreeableness in more detail.

Conclusion

Our results showed strong psychometric properties for the 100-item version of the HEXACO-PI-R, as examined in self-reports from an online sample and in both self- and observer reports from a student sample. Descriptive statistics and alpha reliabilities were appropriate. The 25 facets showed the expected pattern of loadings on six broad dimensions, and the 100 items also defined their intended 25 facet-level dimensions. Correlations between the factor-level scales were rather weak. Strong convergent correlations and weak discriminant correlations were obtained between self-reports and observer reports from closely acquainted persons. We recommend the HEXACO-100 for use in research settings whenever a measure of the major personality dimensions is desired.

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Notes

1. The cutoff values used for the latter two procedures were deliberately chosen to be very conservative, because the purpose of this procedure was to screen out obviously invalid responses, ones that could be detected by visual inspection (e.g., 3333333333, 1234512345, etc.). Consequently, only a very small number of responses were excluded by these

criteria, and including these responses did not make any discernible differences in the present results.

2. The varimax-rotated six-component solutions all showed dimensions clearly interpretable as the six HEXACO factors. When we examined the varimax-rotated seven-component solution in the analyses involving self-report items, the seventh component did not have any substantive meaning but the pattern of loadings on this component corresponded fairly closely with the item direction of keying. As such, the emergence of the small seventh component in self-reports reflects acquiescence response bias. This small factor did not emerge in the analysis involving observer reports, a finding consistent with a recently reported result indicating that acquiescence bias is more prominent in self-reports than in observer reports (Ashton, de Vries, & Lee, in press).
3. We include in the "posttabloid article" sample all persons who responded on or after June 9th, because the effect of the tabloid articles appeared to have persisted for months, with traffic to the hexaco.org website remaining two or three times higher than before the articles appeared.
4. The pretabloid and posttabloid article samples differed in some demographic variables. Specifically, the posttabloid article participants were on average older (37.8 years vs. 29.8 years), slightly more likely to be men (50.4% vs. 48.4%), and more likely to have postgraduate degrees (33.6% vs. 22.9%). None of these differences in demographic variables could explain the difference in the correlation between Honesty–Humility and Agreeableness across the two samples.
5. We have previously reported self/observer agreement for the factor scales within a large subset of this sample (see, e.g., Ashton et al., 2014, Table 4).
6. Item-total facet correlations as observed in the online sample are provided in the appendix found in the supplementary materials.

References

Aghababaei, N., Wasserman, J. A., & Nannini, D. (2014). The religious person revisited: Cross-cultural evidence from the HEXACO model of personality structure. *Mental Health, Religion, & Culture*, *17*, 24-29.

Ashton, M. C., de Vries, R. E., & Lee, K. (in press). Trait variance and response style variance in the scales of the Personality Inventory for DSM-5 (PID-5). *Journal of Personality Assessment*.

Ashton, M. C., & Lee, K. (2001). A theoretical basis for the major dimensions of personality. *European Journal of Personality*, *15*, 327-353.

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of personality structure. *Personality and Social Psychology Review*, *11*, 150-166.

Ashton, M. C., & Lee, K. (2008). The prediction of honesty-humility-related criteria by the HEXACO and five-factor models of personality. *Journal of Research in Personality*, *42*, 1216-1228.

Ashton, M. C., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment*, *91*, 340-345.

Ashton, M. C., & Lee, K. (2010). Trait and source factors in HEXACO-PI-R self- and observer reports. *European Journal of Personality*, *24*, 278-289.

Ashton, M. C., Lee, K., & de Vries, R. E. (2014). The HEXACO Honesty-Humility, Agreeableness, and Emotionality Factors: A review of research and theory. *Personality and Social Psychology Review*, *18*, 139-152.

Ashton, M. C., Lee, K., Goldberg, L. R., & de Vries, R. E. (2009). Higher-order factors of personality: Do they exist? *Personality and Social Psychology Review*, *13*, 79-91.

Ashton, M. C., Lee, K., Perugini, M., Szarota, P., de Vries, R. E., Di Blas, L., . . . De Raad, B. (2004). A six-factor structure of personality-descriptive adjectives: Solutions from psycholexical studies in seven languages. *Journal of Personality and Social Psychology*, *86*, 356-366.

Ashton, M. C., Lee, K., Pozzebon, J. A., Visser, B. A., & Worth, N. C. (2010). Status-driven risk taking and the major dimensions of personality. *Journal of Research in Personality*, *44*, 734-737.

Ashton, M. C., Lee, K., Visser, B. A., & Pozzebon, J. A. (2008). Phobic tendency within the Five-Factor and HEXACO models of personality structure. *Journal of Research in Personality*, *42*, 734-746.

Beer, A., & Watson, D. (2008). Asymmetry in judgments of personality: Others are less differentiated than the self. *Journal of Personality*, *76*, 535-560.

Bourdage, J. S., Wiltshire, J., & Lee, K. (2015). Personality and workplace impression management: Correlates and implications. *Journal of Applied Psychology*, *100*, 537-546.

Chirumbolo, A., & Leone, L. (2010). Personality and politics: The role of the HEXACO model of personality in predicting ideology and voting. *Personality and Individual Differences*, *49*, 43-48.

Cohen, T. R., Panter, A. T., Turan, N., Morse, L., & Kim, Y. (2014). Moral character in the workplace. *Journal of Personality and Social Psychology*, *107*, 943-963.

Cohen, T. R., Wolf, S. T., Panter, A. T., & Insko, C. A. (2011). Introducing the GASP scale: A new measure of guilt and shame proneness. *Journal of Personality and Social Psychology*, *100*, 947-966.

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources.

De Raad, B., Barelds, D. P., Timmerman, M. E., De Roover, K., Mlačić, B., & Church, A. T. (2014). Towards a pan-cultural personality structure: Input from 11 psycholexical studies. *European Journal of Personality*, *28*, 497-510.

De Vries, R. E. (2013). The 24-item brief HEXACO Inventory (BHI). *Journal of Research in Personality*, *47*, 871-880.

De Vries, R. E., Realo, A., & Allik, J. (2016). *Using personality item characteristics to predict single-item reliability, retest reliability, and self-other agreement*. Manuscript submitted for publication.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 Aspects of the Big Five. *Journal of Personality and Social Psychology*, *93*, 880-896.

Donnellan, M. B., Oswald, F. L., Baird, B. M., & Lucas, R. E. (2006). The mini-IPIP scales: Tiny-yet-effective measures of the Big Five factors of personality. *Psychological Assessment*, *18*, 192-203.

Gaughan, E. T., Miller, J. D., & Lynam, D. R. (2012). Examining the utility of general models of personality in the study of psychopathy: A comparison of the HEXACO-PI-R and NEO PI-R. *Journal of Personality Disorders*, *26*, 513-523.

Hilbig, B. E., & Zettler, I. (2009). Pillars of cooperation: Honesty–Humility, social value orientations, and economic behavior. *Journal of Research in Personality*, *43*, 516-519.

Hilbig, B. E., & Zettler, I. (2015). When the cat's away, some mice will play: A basic trait account of dishonest behavior. *Journal of Research in Personality*, *57*, 72-88.

Jackson, D. N. (1978). Interpreter's guide to the Jackson Personality Inventory. In P. McReynolds (Ed.), *Advances in psychological assessment* (Vol. 4, pp. 55-102). San Francisco, CA: Jossey-Bass.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138). New York, NY: Guilford Press.

Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO Personality Inventory. *Multivariate Behavioral Research*, *39*, 329-358.

Lee, K., & Ashton, M. C. (2006). Further assessment of the HEXACO Personality Inventory: Two new facet scales and an observer report form. *Psychological Assessment*, *18*, 182-191.

Lee, K., & Ashton, M. C. (2008). The HEXACO personality factors in the indigenous personality lexicons of English and 11 other languages. *Journal of Personality*, *76*, 1001-1053.

Lee, K., & Ashton, M. C. (2012a). Getting mad and getting even: Agreeableness and Honesty-Humility as predictors of revenge intentions. *Personality and Individual Differences*, *52*, 596-600.

Lee, K., & Ashton, M. C. (2012b). *The H factor of personality: Why some people are manipulative, self-entitled, materialistic, and exploitive—And why it matters for everyone*. Waterloo, Ontario, Canada: Wilfrid Laurier University Press.

Lee, K., & Ashton, M. C. (2013). Prediction of self- and observer report scores on HEXACO-60 and NEO-FFI scales. *Journal of Research in Personality*, *47*, 668-675.

Lee, K., Ashton, M. C., Wiltshire, J., Bourdage, J. S., Visser, B. A., & Gallucci, A. (2013). Sex, power, and money: Prediction from the Dark Triad and Honesty–Humility. *European Journal of Personality*, *27*, 169-184.

Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology*, *10*, 85-110.

McCrae, R. R., Kurtz, J. E., Yamagata, S., & Terracciano, A. (2011). Internal consistency, retest reliability, and their implications for personality scale validity. *Personality and Social Psychology Review*, *15*, 28-50.

McKay, D. A., & Tokar, D. M. (2012). The HEXACO and five-factor models of personality in relation to RIASEC vocational interests. *Journal of Vocational Behavior*, *81*, 138-149.

Noftle, E. E., & Robins, R. W. (2007). Personality predictors of academic outcomes: Big Five correlates of GPA and SAT scores. *Journal of Personality and Social Psychology*, *93*, 116-130.

Paunonen, S. V. (1997). On chance and factor congruence following orthogonal Procrustes rotation. *Educational and Psychological Measurement*, *57*, 33-59.

Romero, E., Villar, P., & López-Romero, L. (2015). Assessing six factors in Spain: Validation of the HEXACO-100 in relation to the Five Factor Model and other conceptually relevant criteria. *Personality and Individual Differences*, *76*, 75-81.

Saroglou, V., Pichon, I., Trompette, L., Verschueren, M., & Dernelle, R. (2005). Prosocial behavior and religion: New evidence based on projective measures and peer ratings. *Journal for the Scientific Study of Religion*, *44*, 323-348.

Schönemann, P. H. (1966). A generalized solution of the orthogonal Procrustes problem. *Psychometrika*, *31*, 1-10.

Sibley, C. G., Luyten, N., Purnomo, M., Mobberley, A., Wootton, L. W., Hammond, M. D., . . . West-Newman, T. (2011). The Mini-IPIP6: Validation and extension of a short measure of the Big-Six factors of personality in New Zealand. *New Zealand Journal of Psychology*, *40*, 142-159.

Thalmayer, A. G., Saucier, G., & Eigenhuis, A. (2011). Comparative validity of brief to medium-length Big Five and Big Six personality questionnaires. *Psychological Assessment*, *23*, 995-1009.

Thielmann, I., Hilbig, B. E., Zettler, I., & Moshagen, M. (2016). On measuring the sixth basic personality dimension: A comparison between HEXACO Honesty-Humility and Big Six Honesty-Propriety. *Assessment*. Advance online publication. doi:10.1177/1073191116638411

Weller, J. A., & Thulin, E. W. (2012). Do honest people take fewer risks? Personality correlates of risk-taking to achieve gains and avoid losses in HEXACO space. *Personality and Individual Differences*, *53*, 923-926.

Winterstein, B. P., Silvia, P. J., Kwapil, T. R., Kaufman, J. C., Reiter-Palmon, R., & Wigert, B. (2011). Brief assessment of schizotypy: Developing short forms of the Wisconsin Schizotypy Scales. *Personality and Individual Differences*, *51*, 920-924.

Zettler, I., Hilbig, B. E., & Haubrich, J. (2011). Altruism at the ballots: Predicting political attitudes and behavior. *Journal of Research in Personality*, *45*, 130-133.

Zettler, I., Hilbig, B. E., & Heydasch, T. (2013). Two sides of one coin: Honesty-Humility and social factors mutually shape social dilemma decision making. *Journal of Research in Personality*, *47*, 286-295.