Psychol Stud (January–March 2022) 67(1):89–98
https://doi.org/10.1007/s12646-022-00648-9

ASSESSMENT

# Measuring the Six-factor Model Dimensions: Psychometric Properties of the Georgian Version of the HECAXO-PI-R

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Received: 1 July 2021 / Accepted: 24 January 2022 / Published online: 28 February 2022


**Abstract** The current study presents the psychometric investigation of the Georgian translation of the HEXACO-PI-R-GE (Lee, & Ashton, 2018). Altogether, 2448 individuals across four independent samples participated in the standardization process of the instrument. The results show that the six-factor structure is replicated in the Georgian translation with low intercorrelations between the broad HEXACO factors. The internal consistency coefficients reached the recommended level for personality inventories for the big six dimensions and were acceptable for small facets. The HEXACO-PI-R-GE correlated in expected directions with other relevant inventories. Namely, HEXACO Extraversion, Conscientiousness and Openness to Experience had high correlations with the relevant counterparts from the Big Five Inventory; Honesty–Humility negatively correlated with the Dark Triad variables. Women scored substantially higher than men on Emotionality as well as on Honesty-Humility dimensions. There were some other gender differences on facet level. Given its respectable psychometric properties, the HEXACO-PI-R-GE appears to be a valid and useful measure of HEXACO personality traits in the Georgian language.

**Keywords** Six factor model of personality · HEXACO-PI-R · Psychometrics

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**Abbreviations**

| | |
|---|---|
| A | The Agreeableness factor of the HEXACO model of personality |
| BFI | The Big Five Inventory |
| C | The Conscientiousness factor of the HEXACO model of personality |
| D3-Short | The Short Dark Triad |
| DT | Dark Triad |
| E | The Emotionality factor of the HEXACO model of personality |
| FFM | The Five Factor model |
| H | The Honesty-humility factor of the HEXACO model of personality |
| O | The Openness to Experience factor of the HEXACO model of personality |
| The HEXACO-PI-R | The HEXACO Personality Inventory-Revised |
| The HEXACO-PI-R-GE | The Georgian version of the HEXACO personality inventory |
| X | The Extroversion factor of the HEXACO model of personality |
| D3-Short | The Short Dark Triad |

The HEXACO model is a conceptualization of the six-factor structure of personality, which has gained increasing

popularity among personality researchers in recent years. The HEXACO-PI-R (Lee & Ashton, 2018) is the most representative instrument to measure the personality dimensions proposed by the six-factor model, which has been validated in different languages (e.g., Babarović & Šverko, 2013; Boies et al., 2004; Costa et al., 2019; De Vries et al., 2008; Međedović et al., 2019; Ørnfjord, 2018; Romero et al., 2015; Thielmann et al., 2020; Wakabayashi, 2014). This Instrument shows fixed and consistent factorial structure and composition among different languages. While the HEXACO-PI-R has been translated and validated mainly for dominant languages, little is done to facilitate adaptations in those languages, which are related to small countries. However, it is very crucial to examine factorial structures of personality inventories across diverse cultures.

The present research represents a validation of HEXACO-PI-R in the Georgian language by yielding data from a region that is highly under-represented in the scientific literature. In this paper, firstly, we present short theoretical and empirical overview of six-factor model of personality, the Five Factor model (FFM), and Dark Triad (DT). Then, we display the study that validates HEXACO-PI-R in the Georgian language followed by the discussion about the major empirical findings and their scientific value.

## The Six-Factor Model of Personality

Lexical research of personality is one of the most prominent paradigms in exploring the structure of personality traits. The six-factor model of personality, which is based on lexical approach, was suggested in early 2000 (Ashton & Lee, 2001, 2007; Lee & Ashton, 2008). Since then, it has been actively used as a theoretical framework for personality research. Personality traits depicted in the six-factor model are: Honesty–Humility (H), Emotionality (E), Extroversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O). In spite of the fact that these six factors are independent from each other, based on their theoretical interpretation the authors argue (Ashton & Lee, 2007; Lee & Ashton, 2012b) that they can be grouped in two broad conceptual categories: Engagement-related and altruism-related domains. First, Extroversion, Conscientiousness, and Openness to Experience dimensions represent individual differences in engagement of social, work, and idea-related domains. Extroversion is a tendency to engage in activities related to relationships, leadership, and social attention. Conscientiousness reflects individual differences in task-orientation—how much a person strives to be consistent and effective in completing a task. Openness to Experience represents engagement in activities such as imagination, learning and abstract thinking. Second, Honesty–Humility, Agreeableness, and Emotionality dimensions embody individual differences in different forms of altruistic tendencies. According to this conceptualization, Honesty–Humility dimension reflects individual differences in treating others fairly even when one could successfully exploit or defect against them; Agreeableness is a tendency to be patient with others even when one may be treated unfairly. Emotionality is a tendency to prevent harms to self and kin. Thus, Honesty–Humility and Agreeableness represent two forms of reciprocal-altruistic tendency, while Emotionality is relevant to kin altruism.

## The Five Factor Model and Dark Triad Traits as Criterial Variables for the HEXACO Model

The Five Factor Model (FFM) of personality is one of the robust solutions obtained in psycholexical research (Goldberg, 1990; Hofstee et al., 1992; Saucier & Goldberg, 1996), which suggests a structure of five factors named, Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. There is continuous evidence supporting the Big Five structure of personality (e.g., Hamby et al., 2015). However, in recent years, considerable empirical research has accumulated in favor of an alternative model of personality containing dimension beyond the Big Five—The HEXACO model of personality.

There are some similarities but also substantial differences between HEXACO and the Big Five models of personality (Ashton & Lee, 2008; Ashton et al., 2014). The main difference lies in suggesting a new personality dimension, Honesty-Humility, which reflects individual differences in sincerity, fairness, greed avoidance, and modesty as opposed to pretentiousness, greed, deceit, and conceit, and partially reflects ethical or moral aspects of personality—these tendencies are captured less well by the Big Five (Ashton & Lee, 2019; Ashton & Lee, 2018; De Vries et al., 2011). However, honesty-humility dimension shares similarities (Sheppard & Boon, 2012; Hilbig et al., 2013; Lee & Ashton, 2012a) and retains some variance associated with agreeableness but it also represents additional variance not explained by the Big Five traits (Ashton & Lee, 2008; Ashton et al., 2014).

Another difference is related to the factors of Emotionality and Agreeableness (Big Five Neuroticism and Agreeableness, respectively). Emotionality and Agreeableness dimensions are redefined with a slight difference on the facet level (Ashton et al., 2014). For instance, HEXACO Emotionality factor shares some content with the Big Five Neuroticism (i.e., anxiety), but lacks the anger and hostility related aspects of Neuroticism; also, it

contains facet of sentimentality, which belongs to Agreeableness in the Big Five model.

Regarding the similarities of two models, HEXACO three factors—Extraversion, Conscientiousness, and Openness to Experience—closely resemble the corresponding Big Five traits and are highly correlated to their Big Five counterparts, while the others demonstrate more complex relationships with Honesty-Humility among them showing the modest positive correlation to the Big Five Agreeableness (see e.g., Ashton & Lee, 2019; Ashton & Lee, 2008; Ashton et al., 2014; Lee & Ashton, 2013).

The HEXACO and Five-factor models have been constantly examined together with the Dark Triad traits, which combines three socially aversive, conceptually distinct but empirically overlapping personality traits—narcissism, Machiavellianism and psychopathy (Paulhus & Williams, 2002). These aversive traits are viewed as subclinical, normally distributed traits associated to norm-violating behavior (Furnham et al., 2013). The Dark Triad and HEXACO studies consistently show that all three of the Dark Triad traits correlate substantially and negatively with Honesty–Humility. This correlation is stronger than correlations with any other dimension of the Big Five, because Honesty–Humility explicitly contrasts pro-social and anti-social behavior (Lee & Ashton, 2005). Researchers argue that there is a common personality denominator of the Dark Triad traits and the negative pole of the Honesty-humility factor is identical to that. Narcissism strongly correlates with HEXACO Extraversion, whereas the other Dark Triad traits don't (Lee & Ashton, 2005). Correlations among the Dark Triad variables are satisfactorily explained by the HEXACO variables. The results of meta-analytic studies (Howard & Van Zandt, 2020; Muris et al., 2017) also demonstrate that the Dark Triad is predominantly related to the Honest–Humility factor. Thus, researchers concluded that HEXACO factors, in particular Honesty–Humility, explain most of the variance in socially aversive personality traits. Consequently, it is the simplest model of anti-social personality traits.

## The Present Study

The six-factor model of personality has been studied across various cultures and languages, but so far, the model has not been examined in Georgian language, which is an official language of Georgia and is one of the oldest spoken languages in the world with its own unique writing system (the Georgian script). In this study we aim to validate the HEXACO model of personality in Georgian language and to analyze psychometric properties of the Georgian translation (HEXACO-PI-R-GE) of the HEXACO-PI-R by examining its relationship with the Five Factor model and Dark Triad traits.

We expected that: (1) The HEXACO-PI-R-GE will replicate the six-factor structure of the original HEXACO-PI-R; (2) The broad six dimensions mostly will be related with their Big Five counterparts; (3) Honesty–Humility will show strong negative correlations with the Dark Triad variables.

## Method

### Translation Procedure

The preparation of the Georgian version of the questionnaire included several steps. First, two independent translations were prepared. Next, two translated versions were combined to create the first translated version of the instrument, which was back-translated by an independent translator. The authors of the original version approved the semantic equivalence of the back-translated and English versions. After that, an initial administration of the first Georgian version of HEXACO-PI-R (HEXACO-PI-R-GE) was conducted ($n$ = 70) to assess item coherence resulting in revision of several items. This pilot study data was not the part of later samples, which was analyzed.

### Participants and Sample Description

Altogether, 2448 individuals across four independent samples (55.8% women, 0.8% unreported; age range = 17–68; $M_{age}$ = 30.21, SD = 12.30) participated in psychometric investigation of the Georgian version of HEXACO-100. The majority of the participants (44.8%) were students, 35.2% held university degree, 8.0% had professional education, and 12.0% held a secondary or basic school diploma. Sample 1 consisted of a representative sample of the Georgian population ($n$ = 1303), while sample 2 ($n$ = 751), sample 3 ($n$ = 191; 49% women; $M_{age}$ = 21.84, SD = 4.39), and sample 4 ($n$ = 203; 65% women; $M_{age}$ = 19.44, SD = 1.65) consisted of mainly students (convenience sample).

Participation in the study was voluntary. Informed consent was obtained from all participants. They were informed about the goal of the study and about the possibility to drop out at any time without any explanation. Participants did not get any compensation or reward for participation. They completed paper-and-pencil questionnaires anonymously in small groups or individually, and were subsequently debriefed.

## Instruments

*The HEXACO model.* The HEXACO-PI-R (Lee, & Ashton, 2018) is a self-report inventory containing 100 items rated on a five-point scale from 1 (*I disagree completely*) to 5 (*I agree completely*) and measures six dimensions. The Cronbach's alphas of the domains in our study are: Honesty-humility ($\alpha = 0.79$); Emotionality ($\alpha = 0.76$); Extraversion ($\alpha = 0.76$); Agreeableness ($\alpha = 0.74$); Consciousnesses ($\alpha = 0.76$); Openness to experience ($\alpha = 0.75$). Each of the dimensions is measured via four facets and each facet contains four items. In addition to these 24 facets, the instrument contains the interstitial facet of Altruism, which is measured also via four items (reliabilities of all 25 facets in our study range from 0.45 for Prudence to 0.70 for Liveliness).

*The Big Five*. The Georgian version of the Big Five Inventory (Martskvishvili et al., 2020) as the original instrument (BFI; John & Strivastava, 1999) consists of 44 items rated on a 5-point scale from 1 (I disagree completely) to 5 (I agree completely) and measures five dimensions: Openness ($\alpha = 0.79$); Extraversion ($\alpha = 0.82$), Agreeableness ($\alpha = 0.71$), Consciousnesses ($\alpha = 0.82$), and Neuroticism ($\alpha = 0.83$).

*The Dark Triad.* The Dark Triad traits were assessed using the Georgian translation (Rusishvili, 2016) of The Short Dark Triad (D3-Short; Jones & Paulhus, 2014). The inventory consists of 27 items rated on a five-point Likert-type scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*). D3-Short allows assessing: Machiavellianism ($\alpha = 0.74$), narcissism ($\alpha = 0.71$), and psychopathy ($\alpha = 0.78$).

## Analysis

Prior to analysis, the data were examined for accuracy of entry, missing values, and fit between their distributions and the assumptions of analysis. Missing values analysis revealed that performing complete cases analysis would yield a loss of 32 participants and cases with missing values have been deleted. The factor structure of the HEXACO-PI-R-GE was assessed using Principal Axis Factoring. After that, to assess internal consistency, gender differences, and validity of the instrument, Cronbach Alpha, independent samples *t* test, and bivariate correlations were computed.

## Results

### Exploratory Factor Analysis of the HEXACO-PI-R-GE Facets

Based on data of all four samples ($n = 2448$), a principal axis factor analysis with Promax rotation (k = 4) has been conducted on the HEXACO-PI-R-GE facets (Table 1). The scree plot and the Kaiser criterion indicate that six factors should be extracted. The initial eigenvalues for the first ten factors are 3.72, 2.76, 2.22, 1.79, 1.63, 1.32, 0.92, 0.83, 0.78 and 0.72 explaining 14.85%, 11.03%, 8.88%, 7.16%, 6.52%, 5.27%, 3.66%, 3.32%, 3.11%, and 2.89% of the variance, respectively. The six-factor solution explains a total of 53.73% of the variance. The facets' loadings on factors representing the HEXACO six broad dimensions are in line with the model assumptions. The interstitial facet of altruism loads on Emotionality factor, though the loading is low (0.34).

### Descriptives, Gender Differences, and Scale Intercorrelations

Descriptive statistics were obtained by calculating mean of raw scores on HECAXO six factors and their facets. For six dimensions the largest gender difference has been found for Emotionality, whereas the smallest gender difference has been found for Conscientiousness and Openness to Experience (see Table 2). There are no significant gender differences on Extraversion and Agreeableness. As for facets, according to Cohen's *d* the largest gender difference has been found for Sentimentality (Emotionality facet).

As expected, correlations among HEXACO dimensions are low (Table 3), indicating limited overlap between dimensions. The correlation coefficients vary from 0.00 to 0.31.

The validity of the HEXACO-PI-R-GE was assessed by correlations with the Short Dark Triad (based on sample 3) and the Big Five (based on sample 4) (see Table 4). The results show that HEXACO Extraversion, Conscientiousness, and Openness to Experience have high correlations ($> 0.60$) with the relevant counterparts from the Big Five Inventory. The lowest correlation (0.40) has been observed between Neuroticism (BFI) and Emotionality (HEXACO). Comparing amounts of explained variance of the HEXACO factors based on BFI scales and vice versa shows that Extroversion, Conscientiousness, Openness to Experience are equally represented in both measures and Honesty–Humility is the least explained by BFI. Results also show that there is the difference between HEXACO Emotionality and BFI Neuroticism in terms of explained amount of variance: HEXACO dimensions explain larger amount of

**Table 1** Factor Pattern Matrix for HEXACO facets

| | H | E | X | A | C | O |
|---|---|---|---|---|---|---|
| Anxiety | −.02 | **.65** | −.23 | −.17 | .02 | .15 |
| Sentimentality | .13 | **.61** | .18 | .04 | .01 | .00 |
| Dependence | −.17 | **.59** | .05 | −.01 | −.16 | .04 |
| Fearfulness | −.15 | **.58** | −.16 | .10 | .19 | −.16 |
| Altruism | .16 | .34 | .20 | .06 | .04 | .02 |
| Liveliness | .06 | −.09 | **.70** | .02 | −.06 | −.04 |
| Sociability | −.04 | .22 | **.62** | .04 | −.12 | .08 |
| Social Self-Esteem | −.17 | −.04 | **.50** | .07 | .30 | −.12 |
| Social Boldness | −.12 | −.22 | **.47** | −.08 | .04 | .14 |
| Sincerity | **.68** | −.12 | .02 | −.14 | .04 | .00 |
| Modesty | **.63** | .01 | −.06 | .07 | −.03 | −.09 |
| Greed Avoidance | **.61** | −.12 | −.14 | .04 | .03 | .13 |
| Fairness | **.44** | .08 | .01 | .05 | .22 | −.02 |
| Unconventionality | −.06 | −.04 | −.06 | −.04 | −.09 | **.73** |
| Creativity | .07 | −.03 | .11 | .00 | −.05 | **.57** |
| Esthetic Appreciation | .07 | .22 | −.01 | .10 | .07 | **.57** |
| Inquisitiveness | −.04 | −.04 | .01 | .13 | .17 | **.42** |
| Organization | .09 | .08 | .03 | −.01 | **.58** | −.17 |
| Perfectionism | −.03 | .12 | −.04 | −.11 | **.58** | .18 |
| Prudence | .08 | −.12 | −.12 | .08 | **.55** | .03 |
| Diligence | .01 | −.05 | .25 | −.15 | **.52** | .10 |
| Patience | −.10 | −.23 | −.07 | **.67** | .11 | .13 |
| Flexibility | −.08 | .06 | −.10 | **.65** | −.02 | −.02 |
| Forgiveness | .06 | .02 | .13 | **.53** | −.10 | .05 |
| Gentleness | .17 | .11 | .14 | **.48** | −.05 | −.04 |

The significance of bold values are represented the high loadings |>.4|

$n$ = 2248; *E*, emotionality; *X* extraversion; *H*, Honesty–Humility; *O*, openness to Experience; *A*, agreeableness; *C*, Conscientiousness

variance of Neuroticism compared to the explained amount of variance of HEXACO Emotionality.

The results show that all Dark Triad traits negatively correlate with the HEXACO Honesty-humility factor. The highest correlation is observed between HEXACO Honesty–Humility and the Dark Triad composite. HEXACO dimensions explain 27%, 30%, and 31% of variance of Machiavellianism, Narcissism, and Psychopathy, respectively.

## Discussion

Overall, the results show that the factor structure of the original HEXACO-PI-R is fully replicated in the Georgian version and is in agreement with the model assumptions. The six-factor solutions have been generated based on Georgian sample as it has been produced in psycholexical studies in different languages (Ashton et al., 2004). The intercorrelations between the broad HEXACO factors are low, which is also in line with the model assumptions and indicates limited overlap between dimensions. A small exception is the correlation between conscientiousness and openness to experience, which despite their very different nature is medium (0.31). This results can be explained with the fact that in spite of independence of the six dimensions, they can be grouped in two broad conceptual categories: Engagement-related and altruism-related domains (Ashton & Lee, 2007; Lee &Ashton, 2012b). Conscientiousness, and Openness to Experience dimensions (together with Extraversion) represent individual differences in engagement of social, work, and idea-related domains.

As for reliabilities, the internal consistency coefficients reach the recommended level for personality inventories for the big dimensions and as expected given the briefness of the scales, are lower for the facets. The results are

**Table 2** Descriptive Statistics for the HEXACO factors and facets by gender

| | *Total (n = 2,448)* | | *Men (n =1,062)* | | *Women (n = 1,367)* | | $t_{(2,427)}$ | *Cohen's d* |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | | |
| Honesty–Humility | 3.54 | 0.59 | 3.44 | 0.59 | 3.61 | 0.58 | −6.97*** | −.29 |
| Sincerity | 3.79 | 0.83 | 3.74 | 0.84 | 3.83 | 0.82 | −2.68** | −.11 |
| Fairness | 3.50 | 0.91 | 3.35 | 0.93 | 3.63 | 0.88 | −8.07*** | −.32 |
| Greed Avoidance | 3.30 | 0.82 | 3.22 | 0.85 | 3.36 | 0.80 | −4.12*** | −.17 |
| Modesty | 3.55 | 0.73 | 3.47 | 0.75 | 3.61 | 0.72 | −4.74*** | −.19 |
| Emotionality | 3.26 | 0.54 | 3.06 | 0.51 | 3.42 | 0.51 | −17.29*** | −.71 |
| Fearfulness | 3.04 | 0.81 | 2.82 | 0.75 | 3.22 | 0.81 | −12.35*** | −.51 |
| Anxiety | 3.45 | 0.77 | 3.23 | 0.74 | 3.63 | 0.75 | −12.95*** | −.54 |
| Dependence | 2.99 | 0.75 | 2.85 | 0.75 | 3.11 | 0.74 | −8.51*** | −.35 |
| Sentimentality | 3.55 | 0.73 | 3.33 | 0.70 | 3.72 | 0.70 | −13.73*** | −.56 |
| Extraversion | 3.32 | 0.52 | 3.34 | 0.49 | 3.31 | 0.54 | 1.54 | .06 |
| Social Self-Esteem | 3.39 | 0.67 | 3.39 | 0.65 | 3.39 | 0.69 | −.04 | .00 |
| Social Boldness | 2.92 | 0.78 | 2.99 | 0.77 | 2.87 | 0.79 | 4.04*** | .15 |
| Sociability | 3.62 | 0.69 | 3.61 | 0.67 | 3.63 | 0.68 | −.67 | −.03 |
| Liveliness | 3.36 | 0.82 | 3.37 | 0.77 | 3.35 | 0.86 | .68 | .02 |
| Agreeableness | 2.83 | 0.51 | 2.83 | 0.51 | 2.83 | 0.52 | −0.34 | .00 |
| Forgiveness | 2.71 | 0.77 | 2.68 | 0.75 | 2.74 | 0.79 | −1.88 | −.08 |
| Gentleness | 3.29 | 0.71 | 3.23 | 0.71 | 3.34 | 0.70 | −3.80*** | −.16 |
| Flexibility | 2.56 | 0.70 | 2.59 | 0.68 | 2.54 | 0.72 | 1.60 | .07 |
| Patience | 2.75 | 0.74 | 2.81 | 0.75 | 2.71 | 0.72 | 3.16** | .14 |
| Conscientiousness | 3.46 | 0.52 | 3.41 | 0.51 | 3.49 | 0.53 | −3.63*** | −.15 |
| Organization | 3.53 | 0.84 | 3.41 | 0.80 | 3.62 | 0.86 | −5.98*** | −.25 |
| Diligence | 3.56 | 0.73 | 3.56 | 0.70 | 3.56 | 0.75 | .154 | .00 |
| Perfectionism | 3.51 | 0.70 | 3.46 | 0.70 | 3.55 | 0.70 | −2.89** | −.13 |
| Prudence | 3.23 ara> | 0.68 | 3.21 | 0.67 | 3.24 | 0.68 | −1.04 | −.04 |
| Openness to Experience | 3.50 | 0.55 | 3.44 | 0.58 | 3.54 | 0.52 | −4.49*** | −.18 |
| Esthetic Appreciation | 3.84 | 0.77 | 3.65 | 0.80 | 3.99 | 0.71 | −11.31*** | −.45 |
| Inquisitiveness | 3.36 | 0.82 | 3.45 | 0.82 | 3.29 | 0.80 | 4.73*** | .20 |
| Creativity | 3.49 | 0.89 | 3.37 | 0.89 | 3.57 | 0.88 | −5.64*** | −.23 |
| Unconventionality | 3.27 | 0.72 | 3.26 | 0.77 | 3.28 | 0.68 | −.83 | −.03 |
| Altruism | 3.73 | 0.62 | 3.66 | 0.60 | 3.78 | 0.63 | −4.88*** | −.20 |

*p < .05; **p < .01; ***p < .001

**Table 3** Correlations among the HEXACO domains

| | H | E | X | A | C | O |
|---|---|---|---|---|---|---|
| Honesty–Humility (H) | – | .14*** | .02 | .16*** | .31*** | .19*** |
| Emotionality (E) | | – | −.12*** | −.02 | .01 | .04 |
| Extraversion (X) | | | – | −.00 | .29*** | .24*** |
| Agreeableness (A) | | | | – | -.05* | −.00 |
| Conscientiousness (C) | | | | | – | .31*** |
| Openness to Experience (O) | | | | | | – |

n = 2448. *$p < .05$; **$p < .01$; ***$p < .001$

**Table 4** Correlations between the HEXACO-PI-R-GE, the Big Five, and Dark Triad

| H | E | X | A | C | O | | |
|---|---|---|---|---|---|---|---|
| *Dark Triad (sample 3)* | | | | | | $R^2_{HEXACO}$ | |
| Machiavellianism | −.43*** | −.19** | .01 | −.14 | .08 | −.01 | .27 |
| Narcissism | −.35*** | −.09 | .39*** | −.05 | .08 | .18* | .30 |
| Psychopathy | −.43*** | −.21** | .05 | −.26*** | −.14* | .00 | .31 |
| Dark Triad Composite | −.52*** | −.21** | .17* | −.20** | −.00 | .07 | .39 |
| *Big Five (Sample 4)* | | | | | | $R^2_{BFI}$ | |
| Neuroticism | −.02 | .40*** | −.43*** | −.37*** | -.42*** | −.16* | .48 |
| Extraversion | −.34*** | −.11 | .83*** | −.22** | .19** | −.011 | .72 |
| Agreeableness | .39*** | .32*** | .03 | .53*** | .29*** | .10 | .48 |
| Conscientiousness | .11 | −.08 | .39*** | .10 | .81*** | .14 | .69 |
| Openness to Experience | −.12 | −.15* | .34*** | −.10 | .21** | .65*** | .53 |
| $R^2_{HEXACO}$ | .26 | .34 | .72 | .45 | .70 | .53 | |

***$p < .001$* *; $p < .01$; *$p < .05$. $n_{sample3} = 191$. H = Honesty–Humility; E = Emotionality; X = Extraversion; A = Agreeableness; C = Conscientiousness; O = Openness to Experience. $n_{sample4} = 203$. $R^2_{BFI}$—the prediction of BFI scales based on six HEXACO–100 factors. $R^2_{HEXACO}$—the prediction of each of the six HEXACO–100 scales based on BFI scales

mainly similar to those obtained in other studies (Boies et al., 2004; Costa et al., 2019; Međedović et al., 2019; Romero et al., 2015) though our reliability coefficients are slightly lower for small facets.

Gender differences observed in our study are in line with previous findings. Specifically, the largest gender difference for Emotionality (with women scoring higher) (e.g., see Lee & Ashton, 2004, 2006) and a moderate difference in Honesty–Humility factor (Lee & Ashton, 2004, 2006, 2020). Although in both cases the differences are slightly smaller in our study. Gender differences for Emotionality and Honesty–Humility are consistent with the theoretical assumptions suggested by Ashton and Lee (2001). As regard to facets level gender differences, the results are consistent with findings from other countries. e.g., Inquisitiveness and Patience facets show higher means for men, while women score higher on Organization and Aesthetic Appreciation facets as well as on the interstitial scale—Altruism. In their recent study, Lee and Ashton (2020) examining the sex differences in HEXACO personality traits across different countries and ethnicities, report the similar results.

In line with the theoretical interpretations as well as with various empirical findings (Ashton & Lee, 2007; 2019; Ashton et al., 2014; Lee & Ashton, 2004) HEXACO Extraversion, Conscientiousness, and Openness to Experience have high correlations with the relevant counterparts from the Big Five Inventory, indicating similarities between the factors. The lowest correlations have been observed between Neuroticism (BFI) and Emotionality (HEXACO), and between Agreeableness in both models, which can easily be explained by existing differences on the facet levels. The HEXACO dimensions Honesty-Humility, Agreeableness, and Emotionality show lower correlations with BFI factors. Also, these three dimensions are not well explained by BFI factors, which is in accordance with empirical findings regarding HEXACO-PI-R across the use of different measures based on Five-Factor model (Ashton & Lee, 2019). Comparing amounts of explained variance of the HEXACO factors based on BFI factors and vice versa shows that there is the difference between Emotionality (HEXACO) and Neuroticism (BFI): HEXACO dimensions explain larger amount of variance of Neuroticism compared to the explained amount of variance of Emotionality. These findings are also consistent with what Ashtom & Lee (2019) have found in their study.

Previous studies have evidenced negative associations between Dark Traid variables and HEXACO dimensions (e.g., Lee & Ashton, 2014). Specifically, results show that Machiavellianism negatively related with Agreeableness and Extraversion, Narcissism positively related with Extraversion, and Psychopathy negatively related with Conscientiousness and Emotionality (Lee & Ashton, 2014). Georgian data also revealed associations between HEXACO dimensions and Dark Triad traits: Machiavellianism is negatively related with Honesty–Humility and Extraversion, Narcissism is positively related with Extraversion and Openness, but negatively with Honesty–Humility, and Psychopathy is negatively related with Conscientiousness, Honesty–Humility, Agreeableness and Emotionality. Undoubtedly, Honesty-Humility (H) emerged as the strongest opposite trait of DT variables,

which corresponds to the idea that Honesty–Humility is basically the opposite trait to DT composites (Lee et al., 2013). Considering Ashton and Lee's interpretation that Agreeableness and Honesty–Humility are two different but complementary sides of altruistic tendencies (Honesty–Humility corresponds to fairness-based cooperation and Agreeableness to patience-based cooperation), it is not surprising that psychopathy was associated with low Honesty–Humility and low agreeableness. Furthermore, our study provided corresponding evidence what was found in a study linking the HEXACO factors to the Dark Triad (Lee & Ashton, 2005). Specifically, psychopathy was more strongly associated with low Honesty-Humility than with low Agreeableness. These results are also in agreement with the finding that shows that Borderline features are associated with low HEXACO Agreeableness, representing low reactive cooperation, leading to a tendency to retaliate (Hepp et al, 2014).

## Conclusions

The goal of our study was to validate the HEXACO personality inventory for Georgian speaking population. Even though the Georgian-speaking population is not very large, the validation of personality inventories in culturally diverse small countries is important. Because social science research is dominated by samples drawn from WEIRD (western, educated, industrialized, rich, and democratic) societies (Henrich et al., 2010), while other cultures (like Georgian), are highly under-represented. Moreover, psychological research requires valid and reliable instruments to assess personality traits and the widely used questionnaires need to be adapted on specific languages in order to measure the constructs across different cultures.

In general, the use of a heterogeneous and large sample (including a representative sample of the country) undoubtedly represents the strengths of the study as it gives possibility to extend beyond the most frequently used and most convenient samples of students. Study also provides further corroboration of personality research by yielding data from a region that is highly under-represented in psychological literature. However, the limitations of this study should also be noted. e.g., using solely self-report questionnaires. Though the study aimed to validate the self-report instrument itself and therefore self-report data were used, but nevertheless, in addition, convergent validity with other-ratings of HEXACO personality traits and actual behavioral outcomes, the use of behavioral and other-ratings measures would enhance the validity of the instrument.

Notwithstanding these restrictions, given its respectable psychometric properties—factor structure, reliabilities, expected gender differences and correlations with relevant constructs—the current study presents evidence in support of high degree of research potential of the HEXACO-PI-R-GE in the Georgian language. Therefore, the instrument may certainly be used for future practical and research purposes. In sum, it is hoped that the successful Georgian validation of HEXACO-PI-R will allow more diverse research in the area of personality psychology by yielding data from a region that is highly under-represented in modern psychological literature.

**Funding** The research was supported by the Ministry of Defence of Georgia.

**Availability of data and material** The study was funded by the Ministry of Defence of Georgia. Although we don't use military participants data in this manuscript, due to bureaucracy related formal restrictions we don't have the right to share it publicly, but data that support the study findings is available for the reviewers if they find it necessary.

**Declarations**

**Conflict of interest** The study was financially supported by the Ministry of Defense of Georgia.

**Ethics approval** All procedures performed in the study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

**Consent to participate** Informed consent was obtained from all individual participants included in the study.

**Consent for publication** All authors agreed with the content and all gave explicit consent to submit.

## References

Ashton, M. C., & Lee, K. (2001). A theoretical basis for the major dimensions of personality. *European Journal of Personality, 15*(5), 327–353. https://doi.org/10.1002/per.417

Ashton, M. C., & Lee, K. (2007). Empirical, theoretical, and practical advantages of the HEXACO model of Personality Structure. *Personality and Social Psychology Review, 11*(2), 150–166. https://doi.org/10.1177/1088868306294907

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*(5), 1216–1228. https://doi.org/10.1016/j.jrp.2008.03.006

Ashton, M.C., Lee, K. (2019). How well do big five measures capture Hexaco scale variance? *Journal of Personality Assessment, 101*(6), 567–573. https://doi.org/10.1080/00223891.2018.1448986

Ashton, M. C., Lee, K., & De Vries, R. E. (2014). The hexaco honesty-humility, agreeableness, and Emotionality Factors. *Personality and Social Psychology Review, 18*(2), 139–152. https://doi.org/10.1177/1088868314523838

Ashton, M. C., Lee, K., Perugini, M., Szarota, P., De Vries, R. E., Di Blas, L., Boies, K., & 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*(2), 356–366. https://doi.org/10.1037/0022-3514.86.2.356

Babarović, T., & Šverko, I. (2013). The HEXACO personality domains in the Croatian sample. *Drustvena Istrazivanja, 22*(3), 397–411. https://doi.org/10.5559/di.22.3.01

Boies, K., Yoo, T.-Y., Ebacher, A., Lee, K., & Ashton, M. C. (2004). Validity studies psychometric properties of scores on the French and Korean versions of the HEXACO personality inventory. *Educational and Psychological Measurement, 64*(6), 992–1006. https://doi.org/10.1177/0013164404267277

Costa, A. R., Jesuíno, A. D., Lima, N. R., & Shu, F. (2019). Adaptation and validation of HEXACO-PI-R to a Brazilian sample adaptation of HEXACO-pi-R to Brazilian sample. *Personality and Individual Differences, 147*, 280–284. https://doi.org/10.1016/j.paid.2019.04.044

De Vries, R. E., Lee, K., & Ashton, M. C. (2008). The Dutch hexaco personality inventory: Psychometric Properties, self–other agreement, and relations with psychopathy among low and high acquaintanceship dyads. *Journal of Personality Assessment, 90*(2), 142–151. https://doi.org/10.1080/00223890701845195

De Vries, A., de Vries, R. E., & Born, M. P. (2011). Broad versus narrow traits: Conscientiousness and honesty–humility as predictors of academic criteria. *European Journal of Personality, 25*(5), 336–348. https://doi.org/10.1002/per.795

Furnham, A., Richards, S. C., & Paulhus, D. L. (2013). The dark triad of personality: A 10 year review. *Social and Personality Psychology Compass, 7*(3), 199–216. https://doi.org/10.1111/spc3.12018

Goldberg, L. R. (1990). An alternative "description of personality": The big-five factor structure. *Journal of Personality and Social Psychology, 59*(6), 1216–1229. https://doi.org/10.1037/0022-3514.59.6.1216

Hamby, T., Taylor, W., Snowden, A. K., & Peterson, R. A. (2015). A meta-analysis of the reliability of free and for-pay Big Five Scales. *The Journal of Psychology, 150*(4), 422–430. https://doi.org/10.1080/00223980.2015.1060186

Henrich, J., Heine, S. J., Norenzayan, A. (2010). Most people are not WEIRD. *Nature, 466*(7302), 29. https://doi.org/10.1038/466029a

Hepp, J., Hilbig, B. E., Moshagen, M., Zettler, I., Schmahl, C., & Niedtfeld, I. (2014). Active versus reactive cooperativeness in borderline psychopathology: A dissection based on the HEXACO model of personality. *Personality and Individual Differences, 56*, 19–23. https://doi.org/10.1016/j.paid.2013.08.013

Hilbig, B. E., Zettler, I., Leist, F., & Heydasch, T. (2013). It takes Two: Honesty–humility and agreeableness differentially predict active versus reactive cooperation. *Personality and Individual Differences, 54*(5), 598–603. https://doi.org/10.1016/j.paid.2012.11.008

Hofstee, W. K., de Raad, B., & Goldberg, L. R. (1992). Integration of the big five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology, 63*(1), 146–163. https://doi.org/10.1037/0022-3514.63.1.146

Howard, M. C., & Van Zandt, E. C. (2020). The discriminant validity of honesty-humility: A meta-analysis of the HEXACO, big five, and Dark Triad. *Journal of Research in Personality, 87*, 103982. https://doi.org/10.1016/j.jrp.2020.103982

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* (pp. 102–138). New York: Guilford Press.

Jones, D. N., & Paulhus, D. L. (2014). Introducing the Short Dark Triad (SD3): A Brief Measure of Dark Personality Traits. *Assessment, 21*(1), 28–41. https://doi.org/10.1177/1073191113514105

Lee, K., & Ashton, M. C. (2004). Psychometric Properties of the HEXACO Personality Inventory. *Multivariate Behavioral Research, 39*(2), 329–358. https://doi.org/10.1207/s15327906mbr3902_8

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*(2), 182–191. https://doi.org/10.1037/1040-3590.18.2.182

Lee, K., & Ashton, M. C. (2005). Psychopathy, machiavellianism, and narcissism in the five-factor model and the HEXACO model of Personality Structure. *Personality and Individual Differences, 38*(7), 1571–1582. https://doi.org/10.1016/j.paid.2004.09.016

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*(5), 1001–1054. https://doi.org/10.1111/j.1467-6494.2008.00512.x

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*(5), 596–600. https://doi.org/10.1016/j.paid.2011.12.004

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: Wilfrid Laurier University.

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*(5), 668–675. https://doi.org/10.1016/j.jrp.2013.06.002

Lee, K., & Ashton, M. C. (2014). The Dark Triad, the big five, and the HEXACO model. *Personality and Individual Differences, 67*, 2–5. https://doi.org/10.1016/j.paid.2014.01.048

Lee, K., & Ashton, M. C. (2018). Psychometric Properties of the HEXACO-100. *Assessment, 25*(5), 543–556. https://doi.org/10.1177/1073191116659134

Lee, K., & Ashton, M. C. (2020). Sex differences in HEXACO personality characteristics across countries and ethnicities. *Journal of Personality, 88*(6), 1075–1090. https://doi.org/10.1111/jopy.12551

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*(2), 169–184. https://doi.org/10.1002/per.1860

Martskvishvili, K., Sordia, N., & Neubauer, A. (2020). Psychometric Properties of the Georgian Versions of the Big Five Questionnaires. *Georgian Psychological Journal, 1*, 7–29.

Međedović, J., Čolović, P., Dinić, B. M., & Smederevac, S. (2019). The HEXACO personality inventory: Validation and psychometric properties in the Serbian language. *Journal of Personality Assessment, 101*(1), 25–31. https://doi.org/10.1080/00223891.2017.1370426

Muris, P., Merckelbach, H., Otgaar, H., & Meijer, E. (2017). The malevolent side of human nature: A meta-analysis and critical review of the literature on the dark triad (narcissism, Machiavellianism, and psychopathy). *Perspectives on Psychological Science, 12*(2), 183–204. https://doi.org/10.1177/1745691616666070

Ørnfjord, M. (2018). The Norwegian Hexaco-PI-R: Psychometric properties and relationships with the Big Five Inventory. *Scandinavian Psychologist*. https://doi.org/10.15714/scandpsychol.5.e15

Paulhus, D. L., & Williams, K. M. (2002). The Dark Triad of personality: Narcissism, machiavellianism, and psychopathy. *Journal of Research in Personality, 36*(6), 556–563. https://doi.org/10.1016/s0092-6566(02)00505-6

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. https://doi.org/10.1016/j.paid.2014.11.056

Rusishvili, M. (2016). *The Psychometric Properties of the Georgian Version of the Dark Triad-short.* (Unpublished master's thesis). Tbilisi State University, Georgia.

Saucier, G., & Goldberg, L. R. (1996). Evidence for the big five in analyses of familiar English personality adjectives. *European Journal of Personality, 10*(1), 61–77. https://doi.org/10.1002/(sici)1099-0984(199603)10:1%3c61::aid-per246%3e3.0.co;2-d

Sheppard, K.E., Boon, S.D. (2012). Predicting appraisals of romantic revenge: The roles of honesty–humility, agreeableness, and vengefulness. *Personality and Individual Differences, 52*(2), 128–132. https://doi.org/10.1016/j.paid.2011.09.014

Thielmann, I., Akrami, N., Babarović, T., Belloch, A., Bergh, R., Chirumbolo, A., Čolović, P., De Vries, R. E., Dostál, D., Egorova, M., Gnisci, A., Heydasch, T., Hilbig, B. E., Hsu, K.-Y., Izdebski, P., Leone, L., Marcus, B., Međedović, J., Nagy, J., & Lee, K. (2020). The HEXACO–100 across 16 languages: A large-scale test of measurement invariance. *Journal of Personality Assessment, 102*(5), 714–726. https://doi.org/10.1080/00223891.2019.1614011

Wakabayashi, A. (2014). A sixth personality domain that is independent of the Big Five Domains: The psychometric properties of the HEXACO personality inventory in a Japanese sample. *Japanese Psychological Research, 56*(3), 211–223. https://doi.org/10.1111/jpr.12045