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Testing the Validity of a Latvian Multidimensional Forced-choice Personality Inventory*

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The aim of this study is to evaluate the convergent and operational validity of a modified Latvian personality inventory (LPA-3, Perepjolkina, 2014) with a multidimensional forced-choice answer format (LMFI). Using three samples, a validity study of the LMFI was conducted. Convergent validity was evaluated by examining the relations between LMFI on one side and the Big Five Inventory (BFI) and the Machiavellianism scale on the other. Operational validity was evaluated by examining the relations with assessments of subjective job performance, counterproductive work performance and with a measure of scholarly significance. The results

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show good convergent and operational validity for five of the six LMFI factors. The Honesty-Humility measure still needs to be improved. In the future, predictive and discriminant validation studies should be conducted with more representative Latvian samples.

Keywords: multidimensional forced-choice personality inventory, convergent validity, operational validity, personality assessment

Highlights:

- Convergent validity of five of the six LMFI personality factors is equal to the validity of other forced-choice personality measures;
- Operational validity of of five of the six LMFI personality factors is good;
- LMFI can adequately measure five of the six personality dimensions in low-stakes situations.

Multidimensional Forced-choice Personality Inventories

Despite the popularity of rating scales in personality assessment, multidimensional forced-choice (MFC) personality inventories have gained a certain level of approval to deter the impression management of respondents (Arthur et al., 2021). They are less susceptible to faking (Martínez & Salgado, 2021; Salgado & Lado, 2018) and may be used in high-stakes situations (Cao & Drasgow, 2019; Stark et al., 2014) such as personnel selection. In Latvia, there is currently only one standardized personality inventory that is tailored for the Latvian population – the Latvian personality inventory (LPA-3; Perepjolkina, 2014). Nevertheless, the LPA-3 has a rating scale format that may be susceptible to faking. To develop a personality assessment for the Latvian population that could be used in high-stakes situations, a new variant of the LPA-3 has

been designed using the MFC format. The aims of this study were to modify the LPA-3 response format to the MFC format and to conduct preliminary convergent and operational validity studies in low-stakes situations – for research and self-assessment purposes.

Comparison of Rating Scales and Forced-choice Answer Formats in Personality Assessment

The use of rating scales (e.g., Likert-type) in personality assessment is common – respondents are presented with a single statement and asked to evaluate the extent to which it describes them on a rating scale. The advantages of rating scales are that 1) the absolute standing of the psychological construct may be obtained, 2) the nature of the data is normative, and 3) the comparison between respondents is appropriate. The conscious distortion of self-reported answers to personality tests yields a problem for personnel selection practitioners. The forced-choice (FC) format is proposed as an alternative to make it more difficult for respondents to distort their answers (Arthur et al., 2021) as it differs from rating scales with respect to how test items are presented. Respondents must choose statement(s) from two or more items (called a block) in terms of the best fit to their personality. For example, respondents can be presented with a block consisting of two items – "I consider myself an accurate person" and "Anxious thoughts do not give me peace of mind" – and must choose the statement that describes them the most. There are various FC answer formats – pairs (two statements per block), triplets (three), and quads (four) (Wetzel et al., 2020) – and various instructions, e.g., picking one or more statements from a block, ranking statements, or choosing 'MOst like me and LEast like me' (MOLE) statements. The scoring approach may differ depending on the version (for a review, see Brown & Maydeu-Olivares, 2018).

The disadvantages of the FC format include ipsative scoring (the total score of a test is equal for all respondents) and its impact on psychometric properties – interindividual comparison, construct validity and criterion-related validity (e.g., Brown & Maydeu-Olivares, 2013, 2018). Ipsative data limitation can be reduced if partially ipsative scoring is used (Hicks, 1970). Using partially ipsative scoring means that answers are coded without full dependence on each test item. For example, points for each personality dimension are scored based on whether the statement is positively or negatively keyed (see Table 1) and on what the respondents choose as their answer (most like me and least like me). An example of partial ipsative scoring of an MFC personality assessment is shown in Table 2.

Insert Table 1 and 2 about here

The use of a Thurstonian item response theory (TIRT) model has recently been proposed (Brown & Maydeu-Olivares, 2013) to solve issues with ipsative data, although it may not be effective for existing inventories that are designed with partially ipsative scoring in mind (Fisher et al., 2019), and TIRT scores are highly related to partially ipsative scores (P. Lee et al., 2018). The use of partially ipsative scoring can yield similar personality results compared to normative scoring in honest conditions (e.g., Christiansen et al., 2005; Converse et al., 2010; Goffin et al., 2011; Heggestad et al., 2006). The practical value of partially ipsative tests includes predicting job performance (Salgado & Táuriz, 2014).

Convergent Validity

Research comparing MFC inventories to rating scale inventories has found the construct validity of the MFC format to be reasonably good (Watrin et al., 2019; Wetzel et al., 2020;

Wetzel & Frick, 2020; Zhang et al., 2020). FC formats' validity may not always be as high as for rating scales – correlations between FC and Likert-type questionnaires ranged from .58 to .71 and from .67 to .81 in one study (Heggestad et al., 2006) and from .19 to .48 in another (Hirsh & Peterson, 2008). Therefore, we expected the correlations between the respective personality factors to be moderate to high.

The construction of a Latvian multidimensional forced-choice inventory (LMFI) is based on LPA-3 items (Perepjolkina, 2014). The LPA-3 is a standardized and valid personality assessment tool specifically designed for the Latvian context. It is an integrated version of the five-factor/Big Five and HEXACO personality models that can be used to assess six personality dimensions – Neuroticism, Conscientiousness, Agreeableness, Extraversion, Openness to Experience, and Honesty-Humility. To determine the convergent validity of the LMFI, this study uses the adapted BFI (Perepjolkina & Kālis, 2012; Schmitt et al., 2007), but the relations of the sixth factor – Honesty-Humility – will be determined using the Machiavellianism scale. Machiavellianism is one of the dimensions of the "Dark Triad" personality traits that are defined by three key elements (Jones & Paulhus, 2014): manipulativeness, callous affect and strategic calculating orientation. Meta-analytical findings on the Dark Triad (Muris et al., 2017) reveal that Machiavellianism is negatively related to Honesty-Humility. The convergent validity of the LPA-3 was tested with respective dimensions from BFI and Honesty-Humility with Machiavellianism (Perepjolkina, 2014). The correlations of BFI and LPA-3 ranged from .65 to .79, and the correlation between Honesty-Humility and Machiavellianism was -.52. The expectations of the LMFI's validity could be predicted based on the results of the validity of LPA-3.

Based on the research on the LPA-3's convergent validity and FC formats' validity, we expected the following patterns in our results:

Prediction 1: The LMFI will show moderate to high (.4 to .7) positive correlations with respective BFI factors; and

Prediction 2: Honesty-Humility will show a high (-.7 to -.5) negative correlation with Machiavellianism.

Operational Validity

In organizational psychology, job performance has been used as a validation criterion for personality measures. The history of research into personality and job performance has a long tradition (e.g., Barrick et al., 2001; Hurtz & Donovan, 2000; Salgado & Táuriz, 2014). From the meta-analytical findings using the five-factor model and the Big Five, Conscientiousness and Emotional Stability showed the highest validity coefficient in a European sample (Salgado, 1997), although a recent meta-analysis indicates that of all the personality dimensions, Conscientiousness has the highest relation to job performance (Sackett et al., 2021).

Job performance is a broad concept that incorporates various dimensions of individual performance at work (for a conceptual review, see Koopmans et al., 2011). Job performance can be measured by subjective ratings (e.g., self-reports), others' ratings (e.g., supervisor), or sometimes productivity data (e.g., sales). To measure job performance in various occupations, subjective job performance rating has been used, and it was be used in this study as well. The available samples were students and scientists. In a meta-analytical comparison of creative personality (Feist, 1998), scientists were compared with non-scientists using the five-factor model. The most notable differences were in three aspects: Openness, Extraversion and Conscientiousness. In a more recent piece of research, Openness to Experience, Neuroticism and

Psychoticism predicted scientific creativity (Grosul & Feist, 2014), which was assessed as various citation indexes. In the field of political science, Conscientiousness and Openness to Experience were valid predictors of scholarly productivity, which was operationalized as the number of publications, H-index score and the number of citations (Djupe et al., 2020). As the primary goal for the operational validity of the LMFI is to choose one criterion that could be compared between scientific fields, the H-index – a relatively more objective criterion than subjective job performance – was chosen as the measure of scholarly significance.

Counterproductive work behavior (CWB) is one of the dimensions of work performance (Koopmans et al., 2011). It includes volatile behavior that harms the organization, its legitimate interests, or the members of the organization (Sackett, 2002). In a recent meta-analysis (Y. Lee et al., 2019), the Honesty-Humility factor was established as a valid predictor for CWB. HEXACO domains explain more variance than the Big Five in workplace deviance (Pletzer et al., 2019), which is a conceptually similar concept to CWB, and the two are sometimes used interchangeably. Therefore, in this study, we use CWB as a criterion for the Honesty-Humility factor in the LMFI.

Overall, the following predictions for operational validity of the LMFI were proposed:

Prediction 3: Conscientiousness will be positively related to the subjective job performance (SJP) rating;

Prediction 4: Neuroticism will be negatively related to the SJP rating;

Prediction 5: Honesty-Humility will be negatively related to CWB.

Prediction 6: Openness to Experience will be positively related to scholarly significance measured by the H-index;

No specific predictions regarding relations to criteria were made for the other personality factors (Agreeableness and Extraversion), but the following more general predictions were formulated:

Prediction 7: LMFI Agreeableness' and BFI Agreeableness' relations to SJP and CWB will be similar; and

Prediction 8: LMFI Extraversion's and BFI Extraversion's relations to SJP and CWB will be similar.

Method

Sample

The validity testing samples included students (n = 287) and scientists (n = 158). Only data from completed questionnaires were included, resulting in 71 questionnaires from students currently not working outside their studies (age M = 25.75, SD = 7.36, 85% women, 52% psychology students; Sample 1), 216 from currently employed students (age M = 28.31, SD = 7.87, 85% women, 69% psychology; Sample 2), and 158 scientists (age M = 43.07, SD = 12.68, 65% women, 46% natural sciences, 20% social sciences, 18% humanities, 11% IT, and 5% medicine; Sample 3). Within Sample 3, there were 37 respondents whose H-index was zero and 15 who did not report an H-index rating. These respondents were excluded, so the final sample of scientists consisted of 106 respondents (age M = 44.82, SD = 12.95, 63% women; 59% natural sciences, 13% social sciences, 10% humanities, 9% medicine, 9% IT).

Instrument

The construction of the *Latvian multidimensional forced-choice personality inventory* (LMFI) is based on items from the LPA-3 (Perepjolkina, 2014). Brown and Maydeu-Olivares (2011) noted that the MFC quad format produces the most information. Of all MFC formats,

quads are the least well-researched. The results of the simulation study of Hontagas et al. (2015) imply that using MOLE instruction is best for quads. Therefore, quads with the MOLE instruction format were chosen for the LMFI. The permutations of six personality factor comparisons in quads were created so that every factor is compared to the others only once in the inventory, yielding 15 theoretical blocks that result in 60 items selected from LPA-3 items. Based on research by Jackson et al. (2000) and Converse et al. (2010), social desirability ratings were gathered to decide which items to select for quads. Therefore, an undergraduate student sample (n=104, age *M*=27.29, *SD*=7.46) rated each LPA-3 item using a scale from 1 – very not desirable to 5 – very desirable in a hypothetical situation (personnel selection).

Mean centering was performed on social desirability ratings for every LPA-3 item. Items matched based on social desirability should be as similar as possible (with a difference of less than .5; Hughes et al., 2021). Therefore, based on the permutations of factor comparisons and selecting two desirable and two undesirable items in a block, 15 MFC blocks were created, in which each personality dimension was assessed with ten statements. Partially ipsative scoring was selected for the MFC format, resulting in a score of 0 to 2 for each statement. Statements were then summed for each personality factor, resulting in a theoretical score from 0 to 24 for every personality dimension – Neuroticism, Conscientiousness, Agreeableness, Extraversion, Openness to Experience, and Honesty-Humility. A sample LMFI item can be seen in Table 2.

The *Big Five Inventory* (BFI) (Benet-Martínez & John, 1998; John et al., 1991, 2008) was used in its Latvian adaptation (Perepjolkina & Kālis, 2012). The inventory consists of 44 items that respondents rate on a scale from 1 – do not agree to 5 – completely agree (sample item for Extraversion: “I consider myself as someone who is talkative”). The scores for the following five personality dimensions were obtained, with the reliability of the Latvian version reported in

parentheses: Openness to Experience (α = .83), Conscientiousness (α = .85), Extraversion (α = .88), Agreeableness (α = .74), and Neuroticism (α = .88).

Machiavellianism was measured in the nonworking student sample using nine statements from the Latvian version (Baldiņa, 2017) of the Short Dark Triad Scale (Jones & Paulhus, 2014). Respondents rated every statement from 1 – completely disagree to 5 – completely agree (sample item: "Revealing your secrets is not a good idea"). An average score for the Machiavellianism scale was thus obtained, and the reliability of the Latvian version of the scale was α = .78 (Baldiņa, 2017).

Counterproductive work behavior (CWB) was measured in the samples of employed students and scientists with the office workers' CWB inventory (Milova & Blumbaha, 2013). This inventory consists of 32 statements concerning how often respondents exhibit the stated behaviors, using a scale from 1 – never to 5 – almost always (sample item: "I daydream at work"). An average score for CWB was thus obtained, and the reliability of the inventory was α = .92 (Milova & Blumbaha, 2013).

Subjective job performance (SJP) was measured in the samples of employed students and scientists by three statements – "Overall, how do [you/your supervisor/your peers] rate your job performance during the last year?" – on a scale from 1 to 10, where 1 is 'unsatisfactory' and 10 is 'outstanding'. The results were averaged for the overall SJP rating (Berga & Austers, 2021). The reliability in these samples was α = .78 in the student sample and α = .87 in the scientist sample.

Scholarly significance was measured in the sample of scientists using their citation index (H-index) score in the Scopus database (Elsevier, n.d.). The Scopus database was used because it

includes more articles from various science fields compared to the Web of Science citation index (Burnham, 2006). It also yields a better H-index compared to Google Scholar (Jacsó, 2008).

Finally, the *demographic* questions consisted of the respondents' age, gender, and field of education or science. The demographic questions were optional due to anonymity concerns.

Procedure

This study was conducted during the year 2021. The electronic questionnaires were sent out using QuestionPro. A call for participation was sent to students and scientists from the University of Latvia both individually, using collective e-mails, and personally during lectures. Participation was voluntary, and permission from the faculty's ethics commission was obtained.

Results

Convergent Validity

Predictions 1 and 2 stated that the respective factors of the BFI and LMFI will be moderately to highly correlated and that Honesty-Humility will be highly negatively correlated with Machiavellianism. The correlations between the LMFI, BFI and the Machiavellianism of nonworking students (Sample 1) and employed students (Sample 2) are presented in Table 3. Operational validity coefficients for these samples ranged from .27 (Honesty-Humility) to .78 (Extraversion). Correlations between the two samples regarding the five personality factors did not yield statistically significant differences based on Z-criteria (Soper, 2021): Openness to Experience Z = -0.89, p = .37; Conscientiousness Z = 0.79, p = .43; Extraversion Z = 1.21, p = .23; Agreeableness Z = 0.60, p = .55; Neuroticism Z = -0.29, p = .78. Correlations for the sample of scientists (Sample 3) were also computed (see Table 4). The validity coefficients yielded

similar results to Samples 1 and 2 for five of the six factors, ranging from r_s = .55 for Agreeableness to r_s = .79 for Neuroticism.

Insert Table 3 and 4 about here

Overall, for all three samples, the convergent validity coefficients for the LMFI are as follows: the lowest coefficient was for the Honesty-Humility factor (r_s = -.27, Sample 1), followed by Agreeableness (r_m = .53), Openness to Experience (r_m = .58), Conscientiousness (r_m = .70), Extraversion (r_m = .71), and Neuroticism (r_m = .76). This was in line with Prediction 1, but although the correlation coefficient is in the right direction in relation to Prediction 2, it is smaller than expected.

Operational Validity

The CWB measure and SJP rating were used in Samples 2 and 3 to assess the operational validity of the LMFI (Table 5). We controlled for age and gender, and the partial correlation coefficients between samples were compared (206 respondents in Sample 2 and 101 respondents in Sample 3 are analyzed due to unreported demographic questions).

Prediction 3 stated that Conscientiousness would be positively related to SJP, Prediction 4 stated that Neuroticism would be negatively related to SJP, and Prediction 5 stated that Honesty-Humility would be negatively related to CWB. Conscientiousness was statistically significantly positively related to SJP in Sample 2 but not statistically significantly related to Sample 3 (the difference was non-significant). Neuroticism was negatively related to SJP in both samples. Honesty-Humility was negatively correlated to CWB in both samples.

Insert Table 5 about here

To test Prediction 6, which stated that Openness to Experience would be positively related to scholarly significance, the H-index was used in Sample 3. Correlations with the H-index, LMFI and BFI are reported in Table 6. The partial correlation coefficients of the LMFI and BFI did not differ statistically significantly, so the operational validity of five of the LMFI factors – Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience – is considered as good as the BFI. Openness to Experience did not significantly relate to the H-index as measured by the LMFI and BFI, which was not in line with Prediction 6.

Insert Table 6 about here

To test Predictions 7 and 8, which stated that BFI Agreeableness/Extraversion and LMFI Agreeableness/Extraversion would be similarly related to SJP and CWB, the relations of BFI Agreeableness, BFI Extraversion, LMFI Agreeableness, and LMFI Extraversion to SJP and CWB were compared in Samples 2 and 3 (Table 7). Agreeableness measured with BFI and LMFI yielded different correlation coefficients with SJP in Sample 2 but not in Sample 3, and there were different correlation coefficients with CWB in both samples. Extraversion measured with BFI and LMFI also yielded different correlation coefficients with SJP in Sample 2 but not in Sample 3, and there were non-significantly different correlation coefficients with CWB in both samples.

Insert Table 7 about here

Overall, considering Predictions 3, 4 and 5, Conscientiousness, Neuroticism and Honesty-Humility yielded the proposed relations, and these were not different between the two samples. With regard to Prediction 6, if the H-index is used as a criterion, the LMFI is as good as the BFI, but Openness to Experience is not related to the H-index when using the BFI and LMFI. Predictions 7 and 8 regarding the LMFI's Agreeableness and Extraversion factors obtained mixed results.

Discussion

The present study examined the convergent and operational validity of the LMFI. The convergent validity coefficients for the LMFI varied from .27 to .76. The lowest coefficient was for the Honesty-Humility factor; the other factors correlated moderately to high: LMFI Agreeableness and Openness to Experience correlated moderately with the respective factors in the BFI, while LMFI Conscientiousness, Extraversion and Neuroticism correlated highly with the respective factors in the BFI. The expected values of the convergent validity coefficients are almost in line with expectations. We expected Agreeableness to yield the lowest convergent validity coefficient, not Honesty-Humility, and this finding may be attributed to the fact that convergent validity of Honesty-Humility was measured with the Machiavellianism scale. The meta-analytical range of the corrected coefficient of Honesty-Humility to Machiavellianism was reported as -.40, 95% CI [-.54, -.26] (Muris et al., 2017). Although the r = -.27 observed in this study includes the lowest range of meta-analytical findings, it should be noted that this is still unacceptably low; however, we have no point of reference to compare the FC measures of Honesty-Humility and their relations to Machiavellianism. To further understand the operational validity of LMFI Honesty-Humility, other instruments, such as HEXACO-60 (Ashton & Lee,

2009), should be adapted to Latvian, as this would allow for a more precise measure of Honesty-Humility. Another solution would be to compare the psychometric properties of ten items of the LMFI on a rating scale and their relation to Machiavellianism. This would not allow the properties of LMFI Honesty-Humility to be compared but would instead enable some broader comparisons of the structure of Honesty-Humility items that are used in the LMFI to be made. A third approach would be to gather more data from a representative sample of Latvian employees and use TIRT analysis to explore the factor structure and reliability of the LMFI.

Due to the nature of FC formats, we compared the LMFI convergent validity coefficients found in other studies. O'Neill et al. (2017) reported coefficients ranging from .13 to .83, Joubert et al. (2015) from .50 to .84, and Christiansen et al. (2005) from .52 to .59. Comparing the convergent validity of the Honesty-Humility measure in an FC format and rating scale, two studies related to ours have been found. In the research of Walton et al. (2020), HEXACO triplets were used, and the relations between the FC format and the rating scale were reported as .42, but in the study of Wetzel and Frick (2020), the convergent validity of Honesty-Humility was not reported. Against this background, the validity coefficients for the LMFI are similar to other FC inventories for five (Agreeableness, Neuroticism, Conscientiousness, Extraversion, and Openness to Experience) of the six factors.

Operational validity coefficients were compared in the samples of employed students (Sample 2) and scientists (Sample 3). The relations between the LMFI factors and SJP were comparable and not statistically significantly different between the samples. The two most important factors for SJP – Conscientiousness and Neuroticism – were related to SJP in both samples, which was in line both with our expectations and the meta-analytical findings

concerning Conscientiousness and Emotional Stability in relation to job performance (e.g., Salgado & Táuriz, 2014).

Honesty-Humility was negatively related to CWB, which is in line with our prediction and previous meta-analytical findings (Pletzer et al., 2019), although the reported meta-analytical coefficient for Honesty-Humility and workplace deviance was higher (ρ=-.48) than the coefficient in this study (-.32). To our knowledge, there are no studies that have examined the FC format of HEXACO in relation to CWB, so we have no point of reference for comparison.

Relations between Openness to Experience and the H-index were established in our study. However, we expected Openness to Experience to relate more strongly to the H-index, but that was not the case. One explanation for this could be due to the H-index measure: if Openness to Experience predicts creativity or scientific productivity, other criteria like patents, citations and project funding should be considered, as scientists engage in different tasks that are not included in the H-index. Another explanation may be the high variation of fields of science represented in the study. For example, the prognostic validity of different personality factors in student samples is related to the major of their studies (Vedel et al., 2015), so it may be the case that the variety of scientists who took part in our study could explain the weak relations of Openness to Experience with the H-index.

There were mixed results for the validity of LMFI Agreeableness and Extraversion. The pattern of correlations for LMFI Extraversion was similar to BFI Extraversion when considering SJP and CWB (out of the four correlations, three were not statistically significantly different). Thus, the operational validity of LMFI Extraversion could be considered as good, but with regard to LMFI Agreeableness, the situation is reversed (out of the four correlations, only one was not statistically significant). This may be, firstly, because LMFI Agreeableness and BFI

Agreeableness correlated moderately, so the different coefficients for LMFI and BFI in relation to SJP could be expected. In LPA-3, Agreeableness was related to BFI Agreeableness at a level of .65 (Perepjolkina, 2014), so maybe LMFI Agreeableness captures different aspects than BFI Agreeableness, and the BFI and LMFI correlations with SJP or CWB therefore cannot be compared directly. Secondly, common method bias (e.g., Podsakoff et al., 2003) for BFI, SJP and CWB could explain higher correlations between these constructs, as all were measured by rating scales. It should be noted that when the H-index was used as a criterion, Agreeableness and Extraversion yielded the same correlation coefficients, so all this favors the operational validity of Extraversion being established in two samples, but the operational validity of Agreeableness is established only in scientists' sample.

Overall, the LMFI shows good convergent validity for five factors – Neuroticism, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience – and good operational validity for five factors in both samples – Honesty-Humility, Neuroticism, Extraversion, Conscientiousness, and Openness to Experience – and for Agreeableness in one sample.

There are some limitations to the study and directions for future research that should be highlighted. Firstly, the small sample sizes of this study should be acknowledged. Secondly, the Honesty-Humility factor yielded the lowest convergent validity coefficients, so to understand more about the item composition and yield normative trait standings, a TIRT analysis should be undertaken as this would resolve some of the issues with partially ipsative data (Brown, 2015; P. Lee & Joo, 2021; Ng et al., 2021), albeit not all of them (Fisher et al., 2019; Schulte et al., 2021). To conduct a TIRT analysis, the sample size should be bigger, as the composition of 15 FC blocks in MOLE format yields 90 item comparisons. Such a sample would require a more

representative sample than the one in in this study. Thirdly, the settings in this study were low-stakes (for research purposes only). The validity should be further studied in settings where the LMFI will actually be used (in high-stakes situations).

Other limitations include the unbalanced items across all personality dimensions, that is, almost all the Extraversion statements were socially desirable, and most of the Agreeableness and Neuroticism statements were socially undesirable, and that may have impacted the choice of the respondents to endorse the item in an MFC format. Also, recent research has indicated that balancing with means may result in partially matched items, and another strategy has been proposed (Pavlov et al., 2021). In addition, there may be issues with the measures of SJP, the H-index, and the CWB inventory: SJP may not capture more objective performance data gathered by others, the H-index is not the only criterion by which scientific creativity or productivity can be measured in terms of job performance, and the CWB inventory used in this study would be more appropriate for office workers, not lab scientists. These measures were chosen as proxies to compare BFI and LMFI criteria, but future studies could be conducted where more objective performance data are gathered, e.g., other ratings for various performance dimensions. Finally, the Machiavellianism scale should be replaced with the Honesty-Humility scale of HEXACO-60 for the convergent validity of the LMFI Honesty-Humility factor.

In the future, convergent, discriminant and prognostic validity studies should be conducted for the LMFI, and when the psychometric properties of the test are acceptable, then experiments on faking reduction in high-stakes situations should be carried out.

Implications for Practice

The LMFI can be used in Latvia as an alternative measure for five personality factors – Neuroticism, Conscientiousness, Openness to Experience, Extraversion, and Agreeableness – as

the convergent and operational coefficients achieved a good standard of forced-choice measure. The sixth factor – Honesty-Humility – should be further improved since the convergent validity coefficient did not reach acceptable standards.

Conclusion

Forced-choice formats of personality inventories have gained popularity as an alternative measure to fakable rating scale formats (Wetzel et al., 2021). This study was designed to create a multidimensional forced-choice version of the LPA-3 (LMFI) and conduct a preliminary validity analysis. The overall validity coefficients for five personality factors were good, but the composition and the item endorsement for the Honesty-Humility factor should be further explored in a more representative Latvian sample using TIRT as an analysis method.

References

Arthur, W., Hagen, E., & George, F. (2021). The lazy or dishonest respondent: Detection and prevention. *Annual Review of Organizational Psychology and Organizational Behavior*, *8*(1), 105–137. https://doi.org/10.1146/annurev-orgpsych-012420-055324

Ashton, M., & Lee, K. (2009). The HEXACO-60: A short measure of the major dimensions of personality. *Journal of Personality Assessment*, *91*(4), 340–345. https://doi.org/10.1080/00223890902935878

Baldiņa, L. (2017). *Negatīvu interneta komentāru atkarība no komentētāja tumšās tetrādes personības iezīmēm un komentāru mērķa daļējas sociālās klātbūtnes [Impact of negative internet comments on the commenter's Dark Tetrad personality traits and the partial social presence]* [Bachelor's thesis, University of Latvia]. Unversity of Latvia DSpace. https://dspace.lu.lv/dspace/handle/7/36039

Barrick, M. R., Mount, M. K., & Judge, T. A. (2001). Personality and performance at the beginning of the New Millennium: What do we know and where do we go next? *International Journal of Selection and Assessment*, *9*(1&2), 9–30. https://doi.org/10.1111/1468-2389.00160

Benet-Martínez, V., & John, O. P. (1998). Los Cinco Grandes across cultures and ethnic groups:

Multitrait-multimethod analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology*, *75*(3), 729–750. https://doi.org/10.1037/0022-3514.75.3.729

Berga, L., & Austers, I. (2021). Non-cognitive predictors of subjective job performance in a sample of managers, client support and administrative support specialists. *Human, Technologies and Quality of Education, 2021*, 94–111. https://doi.org/10.22364/htqe.2021.07

Brown, A. (2015). Personality assessment, forced-choice. In J. D. Wright (Ed.), *International Encyclopedia of the Social & Behavioral Sciences* (2nd ed., Issue December 2015, pp. 840–848). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.25084-8

Brown, A., & Maydeu-Olivares, A. (2011). Item response modeling of forced-choice questionnaires. *Educational and Psychological Measurement*, *71*(3), 460–502. https://doi.org/10.1177/0013164410375112

Brown, A., & Maydeu-Olivares, A. (2013). How IRT can solve problems of ipsative data in forced-choice questionnaires. *Psychological Methods*, *18*(1), 36–52. https://doi.org/10.1037/a0030641

Brown, A., & Maydeu-Olivares, A. (2018). Modelling forced-choice response formats. In P. Irwing, T. Booth, & D. Hughes (Eds.), *The Wiley Handbook of Psychometric Testing* (pp. 523–569). John Wiley & Sons. https://doi.org/10.1002/9781118489772.ch18

Burnham, J. F. (2006). Scopus database: a review. *Biomedical Digital Libraries*, *3*(1), 1. https://doi.org/10.1186/1742-5581-3-1

Cao, M., & Drasgow, F. (2019). Does forcing reduce faking? A meta-analytic review of forced-choice personality measures in high-stakes situations. *Journal of Applied Psychology*, *104*(11), 1347–1368. https://doi.org/10.1037/apl0000414

Christiansen, N. D., Burns, G. N., & Montgomery, G. E. (2005). Reconsidering forced-choice item formats for applicant personality assessment. *Human Performance*, *18*(3), 267–307. https://doi.org/10.1207/s15327043hup1803_4

Converse, P. D., Pathak, J., Quist, J., Merbedone, M., Gotlib, T., & Kostic, E. (2010). Statement desirability ratings in forced-choice personality measure development: Implications for reducing score inflation and providing trait-level information. *Human Performance*, *23*(4), 323–342. https://doi.org/10.1080/08959285.2010.501047

Djupe, P. A., Hill, K. Q., Smith, A. E., & Sokhey, A. E. (2020). Putting personality in context: determinants of research productivity and impact in political science. *Scientometrics*, *124*(3), 2279–2300. https://doi.org/10.1007/s11192-020-03592-5

Elsevier. (n.d.). *H-index in Scopus*. https://www.scopus.com/freelookup/form/author.uri

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review*, *2*(4), 290–309. https://doi.org/10.1207/s15327957pspr0204_5

Fisher, P., Robie, C., Christiansen, N., Speer, A., & Schneider, L. (2019). Criterion-related validity of forced-choice personality measures: A cautionary note regarding Thurstonian IRT versus Classical Test Theory scoring. *Personnel Assessment and Decisions*, *5*(1), 49–61. https://doi.org/10.25035/pad.2019.01.003

Goffin, R. D., Jang, I., & Skinner, E. (2011). Forced-choice and conventional personality assessment: Each may have unique value in pre-employment testing. *Personality and Individual Differences*, *51*(7), 840–844. https://doi.org/10.1016/j.paid.2011.07.012

Grosul, M., & Feist, G. J. (2014). The creative person in science. *Psychology of Aesthetics, Creativity, and the Arts*, *8*(1), 30–43. https://doi.org/10.1037/a0034828

Heggestad, E. D., Morrison, M., Reeve, C. L., & McCloy, R. A. (2006). Forced-choice assessments of personality for selection: evaluating issues of normative assessment and faking resistance. *Journal of Applied Psychology*, *91*(1), 9–24. https://doi.org/10.1037/0021-9010.91.1.9

Hicks, L. E. (1970). Some properties of ipsative, normative, and forced-choice normative measures. *Psychological Bulletin*, *74*(3), 167–184. https://doi.org/10.1037/h0029780

Hirsh, J. B., & Peterson, J. B. (2008). Predicting creativity and academic success with a "Fake-Proof" measure of the Big Five. *Journal of Research in Personality*, *42*(5), 1323–1333. https://doi.org/10.1016/j.jrp.2008.04.006

Hontangas, P. M., de la Torre, J., Ponsoda, V., Leenen, I., Morillo, D., & Abad, F. J. (2015). Comparing traditional and IRT scoring of forced-choice tests. *Applied Psychological Measurement*, *39*(8), 598–612. https://doi.org/10.1177/0146621615585851

Hughes, A. W., Dunlop, P. D., Holtrop, D., & Wee, S. (2021). Spotting the "Ideal" personality response. *Journal of Personnel Psychology*, *20*(1), 17–26. https://doi.org/10.1027/1866-5888/a000267

Hurtz, G. M., & Donovan, J. J. (2000). Personality and job performance: The big five revisited. *Journal of Applied Psychology*, *85*(6), 869–879. https://doi.org/10.1037/0021-9010.85.6.869

Jackson, D. N., Wroblewski, V. R., & Ashton, M. C. (2000). The impact of faking on employment tests: Does forced choice offer a solution?. *Human Performance*, *13*(4), 371–388. https://doi.org/10.1207/S15327043HUP1304_3

Jacsó, P. (2008). The pros and cons of computing the h-index using Scopus. *Online Information Review*, *32*(4), 524–535. https://doi.org/10.1108/14684520810897403

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory--Versions 4a and 54*. University of California, Berkeley, Institute of Personality and Social Research.

John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. In O. P John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 114–158). The 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

Joubert, T., Inceoglu, I., Bartram, D., Dowdeswell, K., & Lin, Y. (2015). A comparison of the psychometric properties of the forced choice and Likert scale versions of a personality instrument. *International Journal of Selection and Assessment*, *23*(1), 92–97. https://doi.org/10.1111/ijsa.12098

Koopmans, L., Bernaards, C. M., Hildebrandt, V. H., Schaufeli, W. B., de Vet Henrica, C. W., & van der Beek, A. J. (2011). Conceptual frameworks of individual work performance. *Journal of Occupational & Environmental Medicine*, *53*(8), 856–866. https://doi.org/10.1097/JOM.0b013e318226a763

Lee, P., & Joo, S. (2021). A new investigation of fake resistance of a multidimensional forced-choice measure: An application of differential item/test functioning. *Personnel Assessment and Decisions*, *7*(1), 31–48. https://doi.org/10.25035/pad.2021.01.004

Lee, P., Lee, S., & Stark, S. (2018). Examining validity evidence for multidimensional forced choice measures with different scoring approaches. *Personality and Individual Differences*, *123*(July 2017), 229–235. https://doi.org/10.1016/j.paid.2017.11.031

Lee, Y., Berry, C. M., & Gonzalez-Mulé, E. (2019). The importance of being humble: A meta-analysis and incremental validity analysis of the relationship between honesty-humility and job performance. *Journal of Applied Psychology*, *104*(12), 1535–1546. https://doi.org/10.1037/apl0000421

Martínez, A., & Salgado, J. F. (2021). A meta-analysis of the faking resistance of forced-choice personality inventories. *Frontiers in Psychology*, *12*(September), 1–19. https://doi.org/10.3389/fpsyg.2021.732241

Milova, D., & Blumbaha, Z. (2013). *Biroja darbinieku neproduktīvas uzvedības darba vietā aptauja [Inventory of counterproductive work behavior for office workers]* [Unpublished technical report]. University of Latvia, Faculty of Pedagogy, Psychology and Art, Psychology Department.

Muris, P., Merckelbach, H., Otgaar, H., & Meijer, E. (2017). The malevolent side of human nature. *Perspectives on Psychological Science*, *12*(2), 183–204. https://doi.org/10.1177/1745691616666070

Ng, V., Lee, P., Ho, M.-H. R., Kuykendall, L., Stark, S., & Tay, L. (2021). The development and validation of a multidimensional forced-choice format character measure: Testing the Thurstonian IRT approach. *Journal of Personality Assessment*, *103*(2), 224–237. https://doi.org/10.1080/00223891.2020.1739056

O'Neill, T. A., Lewis, R. J., Law, S. J., Larson, N., Hancock, S., Radan, J., Lee, N., & Carswell, J. J. (2017). Forced-choice pre-employment personality assessment: Construct validity and resistance to faking. *Personality and Individual Differences*, *115*, 120–127. https://doi.org/10.1016/j.paid.2016.03.075

Pavlov, G., Shi, D., Maydeu-Olivares, A., & Fairchild, A. (2021). Item desirability matching in forced-choice test construction. *Personality and Individual Differences*, *183*(July), 111114. https://doi.org/10.1016/j.paid.2021.111114

Perepjolkina, V. (2014). *Daudzdimensionālas personības aptaujas izstrāde un validizācija Latvijas pieaugušo izlasē [Development and validation of a multidimensional personality survey in a sample of Latvian adults]* [Doctoral dissertation, University of Latvia]. University of Latvia DSpace. https://dspace.lu.lv/dspace/bitstream/handle/7/4921/40321-Viktorija_Perepjolkina_2014.pdf?sequence=1

Perepjolkina, V., & Kālis, E. (2012). *Lielā Piecnieka aptaujas (Big Five Inventory) adaptācija*

Latvijā [Adaptation of Big Five Inventory in Latvia] [Unpublished report]. University of Latvia.

Pletzer, J. L., Bentvelzen, M., Oostrom, J. K., & de Vries, R. E. (2019). A meta-analysis of the relations between personality and workplace deviance: Big Five versus HEXACO. *Journal of Vocational Behavior*, *112*, 369–383. https://doi.org/10.1016/j.jvb.2019.04.004

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Sackett, P. R. (2002). The structure of counterproductive work behaviors: Dimensionality and relationships with facets of job performance. *International Journal of Selection and Assessment*, *10*(1–2), 5–11. https://doi.org/10.1111/1468-2389.00189

Sackett, P. R., Zhang, C., Berry, C. M., & Lievens, F. (2021). Revisiting meta-analytic estimates of validity in personnel selection: Addressing systematic overcorrection for restriction of range. *Journal of Applied Psychology, Advanced online publication*. https://doi.org/10.1037/apl0000994

Salgado, J. F. (1997). The five factor model of personality and job performance in the European Community. *Journal of Applied Psychology*, *82*(1), 30–43. https://doi.org/10.1037/0021-9010.82.1.30

Salgado, J. F., & Lado, M. (2018). Faking resistance of a quasi-ipsative forced-choice personality inventory without algebraic dependence. *Journal of Work and Organizational Psychology*, *34*(3), 213–216. https://doi.org/10.5093/jwop2018a23

Salgado, J. F., & Táuriz, G. (2014). The Five-Factor Model, forced-choice personality inventories and performance: A comprehensive meta-analysis of academic and occupational validity studies. *European Journal of Work and Organizational Psychology*, *23*(1), 3–30. https://doi.org/10.1080/1359432X.2012.716198

Schmitt, D. P., Allik, J., McCrae, R. R., Benet-Martínez, V., Alcalay, L., Ault, L., Austers, I., Bennett, K. L., Bianchi, G., Boholst, F., Borg Cunen, M. A., Braeckman, J., Brainerd, E. G., Caral, L. G. A., Caron, G., Martina Casullo, M., Cunningham, M., Daibo, I., De Backer, C., … Sharan, M. B. (2007). The geographic distribution of Big Five personality traits: Patterns and profiles of human self-description across 56 nations. *Journal of Cross-Cultural*

Psychology, *38*(2), 173–212. https://doi.org/10.1177/0022022106297299

Schulte, N., Holling, H., & Bürkner, P. C. (2021). Can high-dimensional questionnaires resolve the ipsativity issue of forced-choice response formats? *Educational and Psychological Measurement*, *81*(2), 262–289. https://doi.org/10.1177/0013164420934861

Soper, D. S. (2021). *Significance of the difference between two correlations calculator* [software]. https://www.danielsoper.com/statcalc/calculator.aspx?id=104

Stark, S., Chernyshenko, O. S., Drasgow, F., Nye, C. D., White, L. A., Heffner, T., & Farmer, W. L. (2014). From ABLE to TAPAS: A new generation of personality tests to support military selection and classification decisions. *Military Psychology*, *26*(3), 153–164. https://doi.org/10.1037/mil0000044

Vedel, A., Thomsen, D. K., & Larsen, L. (2015). Personality, academic majors and performance: Revealing complex patterns. *Personality and Individual Differences*, *85*, 69–76. https://doi.org/10.1016/j.paid.2015.04.030

Walton, K. E., Cherkasova, L., & Roberts, R. D. (2020). On the validity of forced choice scores derived from the Thurstonian Item Response Theory model. *Assessment*, *27*(4), 706–718. https://doi.org/10.1177/1073191119843585

Watrin, L., Geiger, M., Spengler, M., & Wilhelm, O. (2019). Forced-choice versus Likert responses on an Occupational Big Five questionnaire. *Journal of Individual Differences*, *40*(3), 134–148. https://doi.org/10.1027/1614-0001/a000285

Wetzel, E., & Frick, S. (2020). Comparing the validity of trait estimates from the multidimensional forced-choice format and the rating scale format. *Psychological Assessment*, *32*(3), 239–253. https://doi.org/10.1037/pas0000781

Wetzel, E., Frick, S., & Brown, A. (2021). Does multidimensional forced-choice prevent faking? Comparing the susceptibility of the multidimensional forced-choice format and the rating scale format to faking. *Psychological Assessment*, *33*(2), 156–170. https://doi.org/10.1037/pas0000971

Wetzel, E., Frick, S., & Greiff, S. (2020). The multidimensional forced-choice format as an alternative for rating scales. *European Journal of Psychological Assessment*, *36*(4), 511–515. https://doi.org/10.1027/1015-5759/a000609

Zhang, B., Sun, T., Drasgow, F., Chernyshenko, O. S., Nye, C. D., Stark, S., & White, L. A. (2020). Though forced, still valid: Psychometric equivalence of forced-choice and single-

statement measures. *Organizational Research Methods*, *23*(3), 569–590. https://doi.org/10.1177/1094428119836486

Ispitivanje validnosti Letonskog multidimenzionalnog inventara ličnosti sa prisilnim izborom (eng. Latvian Multidimensional Forced-Choice Personality Inventory, LMFI)

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Cilj ove studije je da se ispita konvergentna i operacionalna validnost modifikovanog Letonskog inventara ličnosti (LPA-3, Perepjolkina, 2014) sa multidimenzionalnim formatom prisilnog izbora (LMFI). Studija validnosti je sprovedena korišćenjem tri uzorka. Konvergentna validnost je procenjena pomoću veza LMFI sa Inventarom Velikih pet (eng. Big Five Inventory, BFI) i Skalom makijevalizma. Operacionalna validnost je procenjena preko subjektivne procene učinka na poslu, mere kontraproduktivnog ponašanja na poslu i mere akademskog značaja (ispitanika, prim. prev). Rezultati pokazuju dobru konvergentnu i operacionalnu validnost za pet od šest faktora LMFI. Meru Iskrenosti-skromnosti (eng. Honesty/Humility) treba još poboljšati (da bi dostigla odgovarajuće psihometrijske karakteristke, prim. prev.). U budućnosti su potrebne studije prediktivne i diskriminativne validnosti na reprezentativnijem Letonskom uzorku.

Ključne reči: multidimenzionalni inventar ličnosti sa prisilnim izborom, konvergentna validnost, operacionalna validnost, procena ličnosti

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Table 1

An example of an MFC block with respective personality factors

Block 1	Bearing on the personality factor	Respective personality factor
I am a very accurate person	Positive	Conscientiousness
I cannot lie	Positive	Honesty-Humility
I do not take the initiative to meet other people	Negative	Extraversion
I sometimes tend to be sarcastic and vitriolic	Negative	Agreeableness

Table 2

An example of forced-choice partially ipsative scoring

Block 1	Answer of Respondent A	Scoring of Respondent A	Answer of Respondent B	Scoring of Respondent B	Answer of Respondent C	Scoring of Respondent C
I am a very accurate person	Most like me	2 points		1 point		1 point
I cannot lie		1 point		1 point	Least like me	0 points
I do not take the initiative to meet other people		1 point	Least like me	2 points		1 point
I sometimes tend to be sarcastic and vitriolic	Least like me	2 points	Most like me	0 points	Most like me	0 points

Table 3

Spearman's correlation coefficients in samples of nonworking and employed students

	1	2	3	4	5	6	7	8	9	10	11
1. LMFI O		-.06	.42**	.40**	-.10	.25**	**.62****	.14*	.27**	.39**	-.22**
2. LMFI C	.06		.18**	.11	-.31**	.33**	.05	**.67****	.25**	.19**	-.11
3. LMFI X	.49**	.20		.27**	-.37**	.16*	.41**	.25**	**.71****	.48**	-.37**
4. LMFI A	.18	.34**	.12		-.05	.21**	.27**	.12	.01	**.55****	-.24**
5. LMFI N	-.11	-.39**	-.38**	-.26*		-.26**	-.09	-.33**	-.35**	-.18*	**.75****
6. LMFI H	.21	.38**	.12	.36**	-.23*		.12	.37**	.14*	.40**	-.26**
7. BFI O	**.54****	.05	.44**	-.09	-.23	.08		.23**	.31**	.30**	-.10
8. BFI C	.03	**.72****	.07	.34**	-.37**	.41**	.09		.30**	.21**	-.23**
9. BFI E	.37**	.09	**.78****	.11	-.46**	.05	.40**	-.03		.27**	-.31**
10. BFI A	.00	.30*	.13	**.48****	-.15	.36**	-.02	.19	.09		-.32**
11. BFI N	-.06	-.30*	-.43**	-.40**	**.73****	-.18	-.08	-.24*	-.53**	-.22	
12. Mach.	-.16	.19	-.13	-.27*	-.05	**-.27***	.17	.21	-.11	-.39**	.08

Note. * $p < .05$; ** $p < .01$.

Legend. O – Openness to Experience, C – Conscientiousness, X – Extraversion, A – Agreeableness, N – Neuroticism, H – Honesty-Humility, E – Extraversion, Mach. – Machiavellianism. Convergent validity coefficients are bolded. Below the diagonal – Sample 1 (nonworking students, *n*=71); above the diagonal – Sample 2 (employed students, *n*=216).

Table 4

Spearman's correlation coefficients in sample of scientists

	M	SD	1	2	3	4	5	6	7	8	9	10
1. LMFI O	12.82	2.55										
2. LMFI C	10.80	3.71	-.15									
3. LMFI X	8.86	3.76	.33**	.09								
4. LMFI A	10.75	3.09	.20*	.01	.34**							
5. LMFI N	8.86	3.80	-.08	-.43**	-.40**	-.15						
6. LMFI H	12.61	2.25	.09	.08	-.08	.02	-.11					
7. BFI O	3.59	.69	**.58****	.13	.21*	.01	-.28**	.01				
8. BFI C	3.60	.62	-.03	**.71****	.08	-.05	-.36**	.19*	.28**			
9. BFI E	3.15	.81	.33**	.23*	**.64****	.03	-.40**	.06	.39**	.26**		
10. BFI A	3.85	.60	.26**	.10	.41**	**.55****	-.16	.25*	.19	.10	.22*	
11. BFI N	2.80	.89	-.20*	-.26**	-.42**	-.33**	**.79****	-.10	-.24*	-.21*	-.33**	-.43**

Note. * $p < .05$, ** $p < .01$.
Legend. O – Openness to Experience, C – Conscientiousness, X – Extraversion, A – Agreeableness, N – Neuroticism, H – Honesty-Humility, E – Extraversion. Convergent validity coefficients are bolded. Below the diagonal – Sample 3 (scientists, *n*=106).

Table 5

Partial correlation coefficients between LMFI and CWB and SJP ratings in samples of employed students and scientists (Samples 2 and 3)

	Sample 2 (n=206)		Sample 3 (n=101)		Z-criteria	
	CWB	SJP	CWB	SJP	CWB-CWB	SJP-SJP
1. LMFI H	-.33**	.23**	-.31**	.06	0.18	1.42
2. LMFI N	.15*	-.29**	.44**	-.36**	-2.61**	-0.63
3. LMFI X	-.19*	.28**	-.18	.27**	0.08	0.08
4. LMFI A	-.20**	.11	-.23*	.10	-0.25	0.08
5. LMFI C	-.25**	.24**	-.57**	.34**	-3.18**	-0.88
6. LMFI O	-.22**	.23**	-.06	.10	1.32	1.08

Note. * $p < .05$, ** $p < .01$.
Legend. O – Openness to Experience, C – Conscientiousness, X – Extraversion, A – Agreeableness, N – Neuroticism, H – Honesty-Humility, CWB – counterproductive work behavior rating, SJP – subjective job performance rating.

Table 6

Partial correlation coefficients controlled for age and gender between personality measures and H-index in sample of scientists (n=101)

LMFI Variables	H-index	BFI Variables	H-index	Z-criteria (LMFI and BFI relations)
LMFI H	-.22*	-	-	-
LMFI N	-.09	BFI N	.02	0.49
LMFI X	.21*	BFI E	.24*	-0.22
LMFI A	-.10	BFI A	-.04	0.42
LMFI C	.16	BFI C	.07	0.63
LMFI O	.16	BFI O	.22*	-0.43

Note. * $p < .05$.
Legend. O – Openness to Experience, C – Conscientiousness, X – Extraversion, A – Agreeableness, N – Neuroticism, H – Honesty-Humility, E – Extraversion.

Table 7

Partial correlation coefficients controlled for age and gender between CWB, SJP and Agreeableness and Extraversion in samples of employed students and scientists (Samples 2 and 3)

	Sample 2 (n=206)		Sample 3 (n=101)	
	SJP	CWB	SJP	CWB
1. BFI-A	.31**	-.37**	.25*	-.40***
2. LMFI-A	.11	-.20**	.10	-.23*
Z-score BFI-A to LMFI-A	3.42***	2.97**	1.64	1.95*
3. BFI-X	.36**	-.19*	.29**	-.31**
4. LMFI-X	.28**	-.19*	.27**	-.18
Z-score BFI-X to LMFI-X	1.65*	0	.25	1.60

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.
Legend. A – Agreeableness, X – Extraversion, CWB – counterproductive work behavior rating, SJP – subjective job performance rating.