Criterion-related validity of three personality questionnaires

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Poster

TITLE

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ABSTRACT

Big Five Conscientiousness, the Myers-Briggs Type Indicator Judging dimension and scores from the Hartman Value Profile showed incremental validity over cognitive ability predicting academic performance. MBTI and HVP scores were incrementally valid over Big Five Conscientiousness. Results were similar when factor scores from method factor models were analyzed.

PRESS PARAGRAPH

Non-traditional personality measures, although widely used in organizations, are not as well validated as Big Five measures of personality. In this comparative study, we examined the International Personality Item Pool – a popular Big Five personality measure along with the Myers-Briggs Type Indicator (MBTI) and the Hartman Value Profile (HVP). We found that both the MBTI Judging dimension and HVP measures were stronger predictors of academic performance than conscientiousness.

Interest in the use of personality tests in selection has increased in the past 30 years, spurred on by the agreement among personality theorists on the importance of the Big Five dimensions of personality (Goldberg, 1993). Although there are hundreds of specially designed tests that could qualify as personality tests in use today, a great amount of interest is on the criterion-related validity of the Big Five dimensions and their facets (e.g., Hurtz & Donovan, 2000). Although the Big Five has served as an impetus on the study of personality by industrial-organizational and personality psychologists, it seems fair to say that selection specialists have been somewhat disappointed in the criterion-related validity of the Big Five dimensions. Only one – Conscientiousness – has been found to be generally valid over a wide range of jobs. Even so, validities have been only moderate, with many meta-analytic estimates reported to be around .20 (e.g. Barrick, & Mount, 1991; Hurtz & Donovan, 2000)

A second personality questionnaire that has been often used in organizational settings is the Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985). The MBTI was originally conceived as an operationalization of Jungian typology, with indices measuring four opponent pairs of characteristics– Extraversion-Introversion, Sensing-Intuition, Thinking-Feeling, and Judgment-Perception (McCrae & Costa, 1989). In spite of its widespread use in organizations, the majority of evaluations of the four-fold typology of MBTI have been negative (e.g., McCrae & Costa, 1989; Pittenger, 1993; 2005). For this reason, many researchers have ignored the typologies and simply used respondents' scores on the four MBTI dimensions as continuous variables. In this latter regard, for many years researchers have known that the four MBTI dimensions are highly correlated with four of the Big Five dimensions – Extraversion-Introversion with Extraversion, Sensing-Intuition negatively with Openness, Thinking-Feeling negatively with Agreeableness, and Judging-Perceiving with Conscientiousness.

In spite of its widespread use in organizations, there is little evidence of the use of the MBTI in selection contexts. In fact, a literature search returned no published articles that would allow comparing the criterion-related validity of the MBTI with that of Big Five personality scales. Apparently use of the MBTI has not included employee selection. Given the above cited high convergent validities between corresponding Big Five and MBTI scales, one might argue that it would be a waste of time to evaluate the MBTI scales when the Big Five scales have already been well tested and validated. There are two reasons for pursuing a separate evaluation of the MBTI. First, the MBTI may be the only personality data possessed by an organization. It may be that in many organizations, the influence of HR has only extended as far as introducing the MBTI for consideration of the typologies. Because scoring the questionnaire for the four continuous dimensions is relatively easy and may have already occurred when respondent types were identified, the use might cost the organization very little.

A second reason for considering the MBTI for selection purposes stems from the fact that the MBTI scale correlations with Big Five scales are not too high to rule out the possibility of the MBTI scales measuring what is not represented by Big Five scale scores. For example, Edwards, Lanning, and Hooker (2010, p 434) noted that correlations between Big Five scale scores and MBTI scale scores do not approach the limits imposed by the reliabilities of the respective scales and reported that from 26% to 68% of the reliable variance in each MBTI scale is not shared with its Big five counterpart as measured by the NEO-PI-R. This result means that it is certainly possible that scores on the MBTI dimensions might exhibit incremental validity over corresponding Big Five dimension scores.

In addition to the Big Five and the MBTI, we investigated the predictive validity of scores from a third personality questionnaire, the Hartman Value Profile (Hartman, 1967). In

this instrument, a respondent puts statements in rank order based on their value to the respondent. From the final rank ordering, a collection of scores is derived. For the purposes of this study, three such scores were used – Differentiation (DIF), the ability to pay attention to nuance and that which is subtle, Dimension (DIM), the intensity of energy that the respondent gives to the decision making process, and AI%Attitude (AIPCT), the presence of compromising stress.

The need to investigate the criterion-related validity of general personality inventories other than the Big Five is apparent in light of the large proportion of unexplained variance in criteria. Based on the above mentioned meta-analytic estimates of validity of Conscientiousness, the generally most valid predictor of job performance, more than 90% of criterion variance is unaccounted for. Thus, there is considerable reason to explore alternative general personality questionnaires in the prediction of performance criteria. For that reason the first purpose of this paper was to explore the relative validities of three such questionnaires – the IPIP Big Five, the MBTI, and the Hartman Value Profile measure. Academic performance as represented by overall undergraduate grade point average (UGPA) was used as the criterion for the study. Previous studies have found that UGPA is consistently related to conscientiousness (e.g., Conard, 2004). Because of the importance of cognitive ability in the determination of UGPA, the Wonderlic Personnel Test was included in the prediction equations analyzed in this study.

A second purpose of the paper is to investigate the extent to which common method variance is present in the MBTI and, if so, the extent to which that variance is related to bias that has been identified in Big Five questionnaires (Biderman, Nguyen, Cunningham, & Ghorbani 2011). The existence of common method variance, indicating the presence of a common method factor, has been found in situations in which respondents have been instructed or given

incentives to fake good (Biderman & Nguyen, 2004; Biderman & Nguyen, 2009; Klehe, Kleinmann, Hartstein, Melchers, König, Heslin, & Lievens, in press). More importantly for the present study, evidence for common method variance has also been found in situations in which no explicit instructions or incentives to fake have been given (Biderman et al., 2011). If a factor other than the factors intended by the questionnaire authors affects responses to the questionnaire items, the variance associated with the extraneous factor will be added to that of the scale scores and may distort estimates of the relationships of criteria to the scales. Because the Big Five questionnaire used in the present study is the same studied in five different samples by Biderman et al. (2011), we expected to find common method variance in the Big Five questionnaire employed in this study. However, there has been no investigation of common method variance in responses to the MBTI. Because the MBTI uses a dichotomous response format that is not a traditional Likert scale, whether or not an influence that is common across all MBTI items exists remains unanswered. If such an influence exists, its relationship to the common method factor from the Big Five questionnaire will also be of interest. The HVP uses a very different response format, so we did not attempt to identify a common method factor in the HVP responses.

METHOD

Participants

Participants were 328 undergraduates at a medium sized public university in the southeastern U.S. Respondents participated for extra credit in psychology classes. Respondent characteristics were: 29.6% male, 68.0% White, 24.1% Black, with the remaining 7.9% categorized as Other. Mean age was 20.3 (SD = 5.3).

Measures

Big Five. The 50-item Big Five questionnaire available from the International Personality Inventory Pool (IPIP) web site (www.ipip.org) was used. The response scale was seven-point, with response alternatives labeled from "Completely Accurate" to "Completely Inaccurate". Individual Big Five scale scores were computed as the mean of the 10 items from each dimension after reverse-scoring the negatively worded items.

Myers-Briggs Type Indicator. A dichotomous response scale was used for the 93 item Form M of the MBTI. MBTI scale scores were obtained by computing the mean of each dimension's items, after reverse scoring the appropriate items. It was decided to score the items so that larger scale scores would represent greater amounts of Extraversion, Feeling, Judging, and Intuition, since these dimensions generally positively correlate with Big Five dimensions.

Hartman Value Profile. For the HVP, two lists of 18 statements were presented on the screen. Participants were instructed to arrange the statements in the first list in order of value to the respondent. After the first list, the second list was presented and respondents were asked to rearrange those statements in order of value. HVP scores were obtained from the first set of statements using proprietary algorithms from the owners of the questionnaire.

Cognitive ability. The paper and pencil version of the Wonderlic Personnel Test (WPT) Form II was administered to measure cognitive ability (Wonderlic, 1999).

Academic performance. At the end of the academic year in which respondents participated, their end-of-year Grade Point Averages were recorded from the student information system.

Method Factor. A confirmatory factor analysis (CFA) model with an additional common method factor influencing all indicators was fit to the data of the IPIP Big Five measures. A similar model was fit to the data of the MBTI. Figures 1 and 2 show the model for the IPIP and

MBTI measure respectively. For the Big Five data, each item served as an indicator of two factors – the Big Five factor for which the item represented and the common method factor. For the MBTI, five parcels per dimension were formed from the 93 items. Each parcel was the mean of responses to items worded in the direction of the dimension name and reverse scored items that were worded in the opposite of the dimension name. Four or five items were averaged for each parcel, keeping the number of dimension-worded items as nearly equal to the number of opposite-dimension-worded items as possible within each parcel. The five parcels from a dimension served as indicators of that dimension in the CFA. The method factor was assumed to influence each parcel. Loadings of the method factor were specific to the parcel, so if the method factor had a negative influence on a parcel, its loading would be estimated to be negative. For both models, to prevent idiosyncratic effects of individual indicators on the overall solution, the raw loadings within each dimension on the method factor were set to be equal.

*Procedur*e

All personality data were collected on-line. For both the Big Five and the MBTI, items were presented one screen at a time, with the response alternatives listed below the item. Participants clicked twice for each item, first to indicate their response choice, then again to move to the next item. The software was programmed to refuse to move to the next item until a response had been made, eliminating missing responses for these scales. The software refused to accept an ordering of the HVP items unless a preset minimum of changes in the order originally presented had been made.

After participants signed informed consent forms, a paper and pencil form of the WPT was administered. Participants were then directed to the web site at which the HVP, IPIP Big Five, and MBTI were administered in the described order. After completing the MBTI,

participants were directed to a second web site where additional questionnaires were administered. The data from those questionnaires will not be reported on here.

RESULTS

Criterion-related validity of scale scores

Means, standard deviations, and correlation coefficients between the measures are presented in Table 1. Inspection of Table 1 reveals that, as expected from prior research, the IPIP Big 5 scale scores were generally slightly positively correlated with one another, with mean correlation equal to .18. The MBTI scales were also correlated, with positive correlations between Extraversion, Feeling and Intuition and negative correlations of Judging with the other three dimensions. The largest correlations between IPIP Big Five and MBTI dimensions were the convergent validity correlations with the IPIP extraversion and MBTI extraversion correlation at .78, .54 for Agreeableness/Feeling, .55 for Conscientiousness/Judging, and the Openness-Intuition correlation at .39. Correlations between the HVP scores and both Big Five and MBTI scores were small.

Simple validities of the predictors are in the bottom row of Table 1. Only three variables exhibited simple predictive validity – cognitive ability, MBTI Judging, and Hartman Value Profile scale score of differentiation (HVP DIF). Multiple regressions were used to assess the incremental validity of the predictors. Due to the overlapping between the IPIP Big Five and MBTI, two regressions were performed. In the first, cognitive ability, Big Five scale scores, and HVP scores were included. In the second regression, cognitive ability, MBTI, and HVP scores were included. The results are presented in Table 2.

The multiple regression results show that cognitive ability was a significant predictor of GPA in both analyses. In the analysis including the Big Five, GPA was positively related to

Conscientiousness, in contrast to the simple regression results. It was also negatively related to the IPIP Openness. In the analysis including the MBTI, GPA was positively related to Judging, as it was in Table 1. In both analyses, the criterion was positively related to the HVP DIF variable. Its relationship to the presence of compromising stress (AIPCT) was significant in both analyses, and its relationship to dimension (DIM) was marginally significant. In both cases, the relationships to these two HVP scales were negative.

Application of the method factor models

Table 3 presents goodness-of-fit results of the application of four CFA models. In the top panel are the results of models applied to the IPIP Big Five data, with results of models applied to the MBTI data in the bottom panel. Row 1 of each panel shows the results of simple CFA models without method factors. Row 2 shows the results of CFA models with an estimated method factor. Chi-square difference tests served as the primary vehicle for determining the statistical significance of the differences in model fit within each panel. In each case, the model with a method factor fit significantly better than the model without a method factor. It should be noted that the goodness-of-fit indices for the MBTI models are much better than those for the Big Five data. This is expected due to the use of parcels as indicators for the MBTI data. The is much evidence that CFA models fit better when parcels, rather than items are used as indicators (e.g., Kenny & McCoach, 2003; Lim & Ployhart, 2006; Thompson & Melancon, 1996).

Table 4 presents mean standardized loadings for each model dimension. The pattern of mean trait loadings is roughly similar across the two datasets, with the largest loadings on the dimensions other than Openness/Intuition. The pattern of mean loadings per dimension on the method factor is the opposite, with the method factor exerting the largest influence on the Openness/Intuition items/parcels for both datasets. The two major differences between the two

datasets were that the method factor exerted essentially no influence on the Judging parcels for the MBTI data and the signs of the loadings on the method factor were opposite for the MBTI Extraversion and Feeling dimensions vs. the Judging and Intuition dimensions.

Table 5 presents the correlations of factor scores from the two models along with cognitive ability (WPT), HVP, and GPA scores. Table 6 presents the results of multiple regression analyses of GPA onto cognitive ability, factor scores from the applications of the method factor model, and HVP variables, with the left side of the panel showing the analysis for IPIP Big Five factor scores and the right side showing the analyses for MBTI factor scores paralleling the presentation in Table 2 with the exception that the predictors in Table 6 are factor scores rather than scale scores. The pattern of results in Table 6 corresponds quite closely to that of Table 2. The most notable difference is that the MBTI Judging factor is only marginally significant in Table 6.

Finally, to estimate the relative validity of Conscientiousness from the IPIP and Judging from the MBTI, two final multiple regressions were performed pitting the measures against each other. In the first analysis shown in the left panel of Table 7, WPT, Big Five Conscientiousness scale scores, MBTI Judging scale scores, and the HVP variables were included. In the second, shown in the right panel, WPT, Big Five Conscientiousness factor scores, MBTI Judging factor scores, and the HVP variables were included. As can be seen from the table, both the Judging scale and factor scores were statistically significant while the Conscientiousness scores were not.

DISCUSSION

The findings suggest that non-traditional personality measures such as the MBTI and the HVP can be valid predictors of a complex criterion such as academic performance. A surprising result was the failure to find simple validity of Big Five Conscientiousness. Because there is

considerable evidence that Conscientiousness measured by Big Five questionnaires is a valid predictor of GPA (e.g., Chamorro-Premuzic & Furnham, 2003; Conard, 2004; Wolfe & Johnson, 1995), it appears that the failure of the IPIP Big Five Conscientiousness to reach statistical significance in the present study may be due to sampling error. Interestingly, the incremental validity of the Big Five Conscientiousness scale in Table 5 was significant when controlling for cognitive ability. That Conscientiousness happened to be slightly negatively correlated with cognitive ability in the present sample may explain why Conscientiousness scale scores were not significant in the simple validity analyses in Table 1.

A more important point concerns the results found for the other two personality measures – the MBTI and HVP. Our findings suggest that they can deliver about the same validity as has been typically found with the Big Five Conscientiousness scale. This means that selection specialists, who, for one reason or another, have the MBTI or the HVP, may be able to use the specific scales found to be valid in this study to achieve modest predictive validity.

Surprisingly, some predictors, notably the HVP Dimension (DIM) and the presence of compromising stress (AIPCT), appear to be suppressor variables. This means that they should be included as predictors, even though it would appear from their zero-order correlations with GPA that they would not be useful. Our results suggest that they do add significantly to validity when used in conjunction with the HVP differentiation (DIF) variable.

The second major finding is that removing the effects of a common method factor had little effect on the validity of the Big Five measures and the MBTI measures. Although the concept and study of method factors has a fairly long history, the study of the effects of common method factors on individual items or parcels within questionnaires has not, so the implications of these results require further research. Biderman et al. (2011) found that removing the effects

of a common method factor on individual items dramatically changed the correlations of Big Five dimensions with external variables. We found similar results, albeit not as striking. The simple validity of Big Five Conscientiousness factor scores was larger than that of scale scores, but by only a small amount - .11 vs. .08. It may be that the reason for the difference in results is that in Biderman et al. (2011), the method factor influenced both the Big Five variables and the external variables, whereas in this study, the method factor influenced only the Big Five variables. Another possibility is that the influence of the common method factor on Conscientiousness was not sufficient to create enough error variance to distort the relationship of Conscientiousness to the criterion. That was very likely the case with the MBTI, in which the mean of the standardized loadings of the common factor on the Judging items was essentially zero, suggesting that extraneous variance due to the common method factor was negligible for the MBTI data. Thus, it appears that for the MBTI questionnaire, the Judging item response alternatives are minimally influenced by whatever overall bias is represented by the common factor. Such item differences have been manipulated with IPIP items by Bäckström, Björklund, & Larsson (2009), who were able to reduce the influence of a common factor on individual items through rewording of the items.

When pitted against each other in the regressions shown in Table 7, the clear winner between Big Five Conscientiousness and MBTI Judging is the Judging dimension. This surprising result suggests that selection specialists who wish to use a measure of the characteristics represented by Conscientiousness scale may be able to take advantage of the MBTI Judging scale. Clearly, further examination of the different facets of Conscientiousness that might be represented by the Judging dimension is warranted.

Finally, the Hartman Value Profile questionnaire certainly deserves further investigation as a tool for selection specialists. Although its rank-ordering response format is little used in selection contexts, the incremental validity afforded by the differentiation, dimension, and the presence of compromising stress variables certainly indicates that further evidence concerning this instrument should be gathered.

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Figure Captions

Figure 1. Common method variance model applied to Big Five items.

Figure 2. Common method variance model applied to MBTI parcels.

Figure 1.

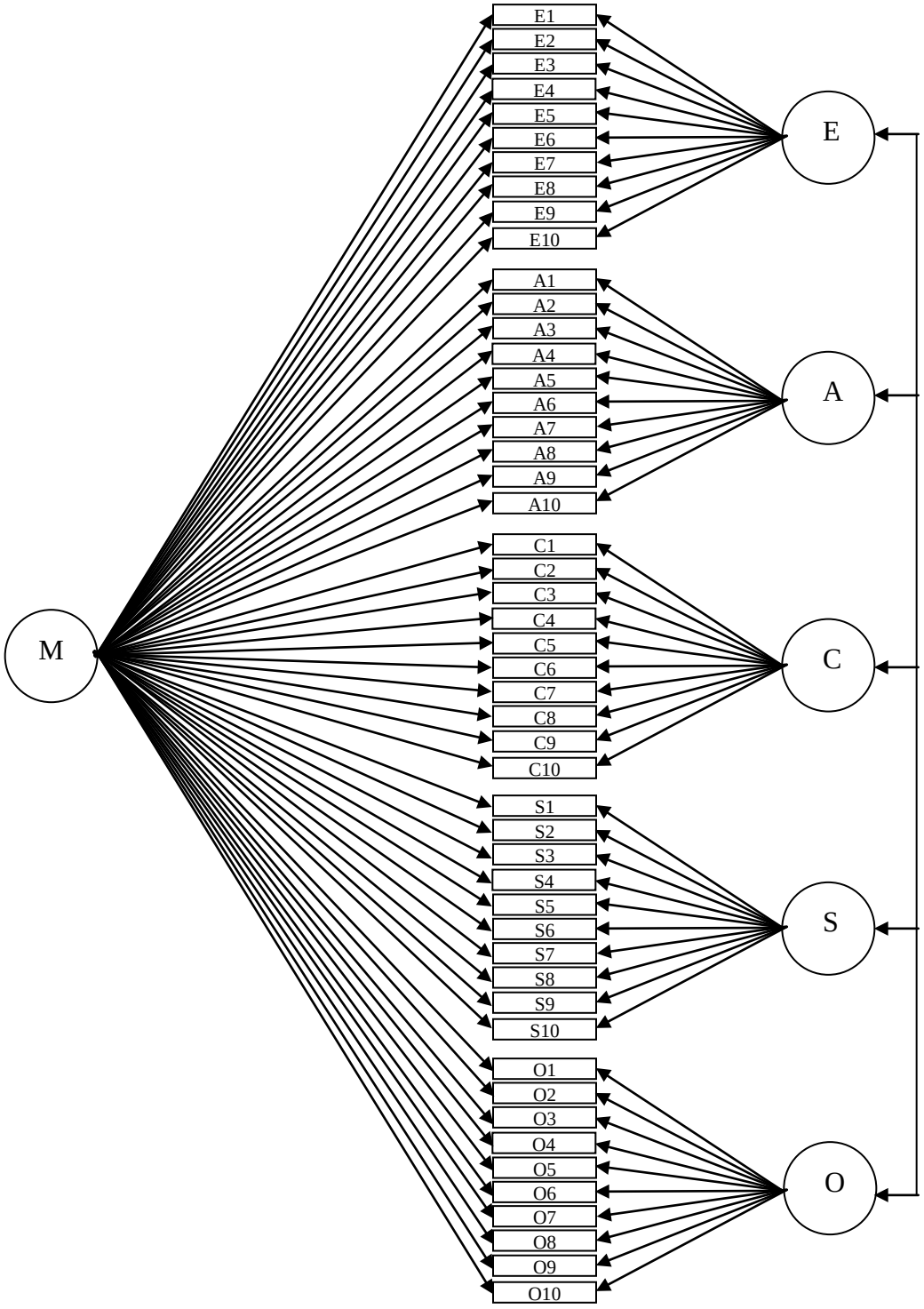
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Figure 2

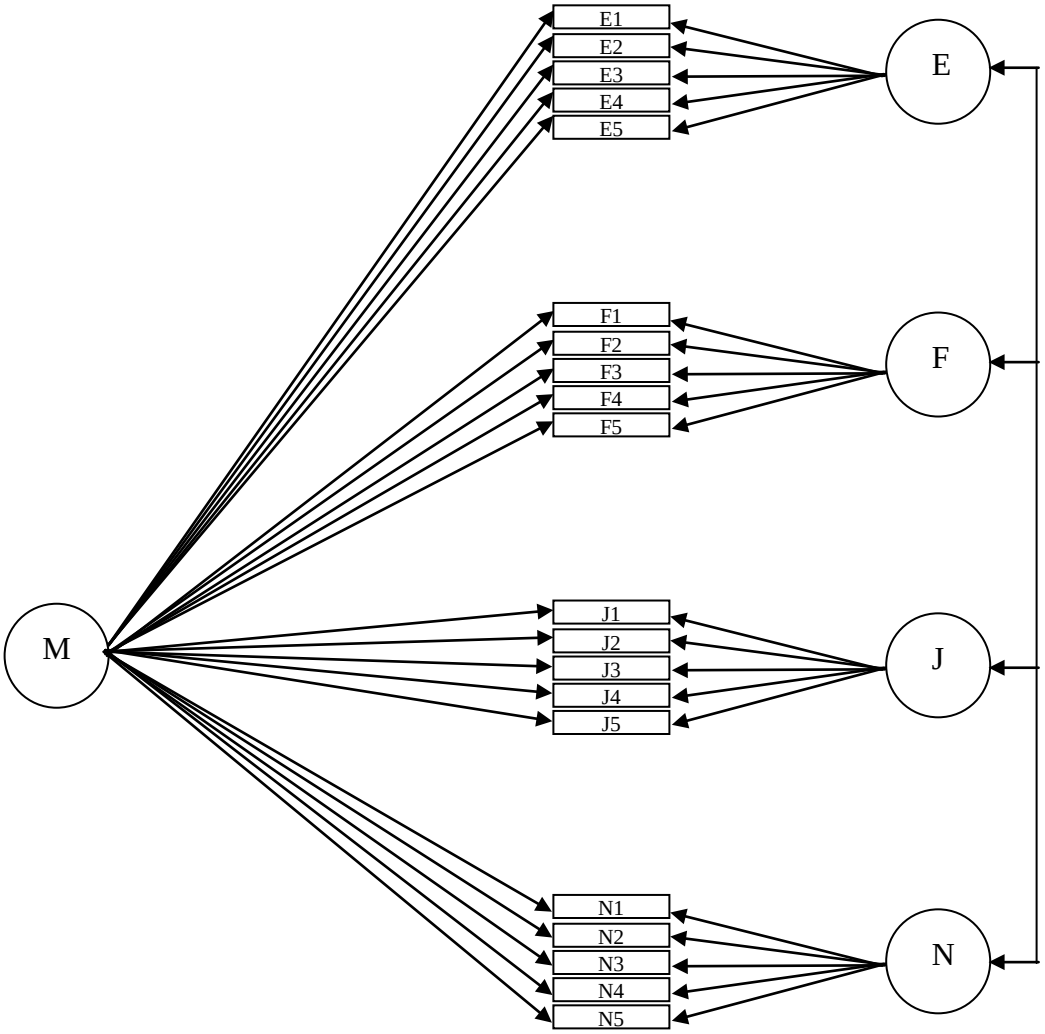

Table 1. Means, standard deviations and correlations between scales. Where available, values on the diagonal are reliability coefficients. N = 328.

Scale	Mean	Std Dev	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 WPT	21.76	5.23	.745													
2 Big Five E	4.80	1.02	-.059	.884												
3 Big Five A	5.68	0.73	.009	.230[c]	.792											
4 Bid Five C	4.86	0.88	-.128[a]	.096	.250[c]	.840										
5 Big Five S	4.28	12.07	.100	.150[b]	-.004	.063	.882									
6 Big Five O	5.08	0.80	.166[b]	.232[c]	.228[c]	.245[c]	.186[b]	.834								
7 MBTI Extraversion	1.64	0.26	-.008	.777[c]	.221[c]	.008	.146[b]	.092	.888							
8 MBTI Feeling	1.68	0.22	-.060	.036	.541[c]	-.062	-.211[c]	-.225[c]	.188[b]	.864						
9 MBTI Judging	1.51	0.24	-.054	-.115[a]	.104	.549[c]	-.145[b]	.049	-.125[a]	-.107	.866					
10 MBTI Intuition	1.55	0.23	.162[b]	.137[a]	.155[b]	-.160[b]	.107	.394[c]	.153[b]	.169[b]	-.384[c]	.870				
11 HVP DIF	73.57	9.82	.218[c]	-.055	.168[b]	-.086	-.018	.055	-.011	.137[b]	-.047	.084				
12 HVP DIM	86.45	9.05	.076	.014	.101	.041	.079	.061	-.013	-.001	-.026	.053	.502[c]			
13 HVP AIPCT	79.8	19.265	.172[b]	-.036	.028	.003	.095	.066	-.011	-.037	.074	.009	.731[c]	.490[c]		
14 UGPA	2.96	0.65	.299[c]	-.072	.067	.079	-.085	-.042	-.060	.061	.209[c]	-.061	.158[b]	-.041	.006	

Table 2. Multiple regression of GPA onto WPT, Big Five, and HVP predictors (left panel) and onto WPT, MBTI, and HVP predictors (right panel).

Predictor	Standardized Coefficient	p	Predictor	Standardized Coefficient	p
WPT	.324	.000	WPT	.301	.000
Big Five E	-.024	.653	MBTI E	-.033	.527
Big Five A	.015	.784	MBTI F	.063	.227
Big Five C	.187	.001	MBTI J	.244	.000
Big Five S	-.067	.209			
Big Five O	-.124	.028	MBTI N	-.043	.441
HVP DIF	.320	.000	HVP DIF	.338	.000
HVP DIM	-.119	.051	HVP DIM	-.098	.099
HVP AIPCT	-.213	.007	HVP AIPCT	-.260	.001
Multiple R	.424		Multiple R	.453	

Table 3. Goodness-of-fit results from application of the method factor models.

Model	Chi-square	df	Δ Chi-square	df	CFI	RMSEA	SRMR
Big Five data							
Simple CFA	2911.117[c]	1165			.739	.068	.086
CFA with method factor	2623.374[c]	1115	287.743[c]	50	.781	.062	.086
MBTI data							
Simple CFA	299.288[c]	164			.959	.050	.056
CFA with method factor	265.353[c]	160	33.935[c]	4	.968	.045	.052

[c] $p < .001$

Table 4. Mean standardized factor loadings from application of method factor models to the Big Five and MBTI data.

Big Five data			MBTI data		
Dimension	Mean	Stddev	Dimension	Mean	Stddev
E Trait loading	.619	.080	Extraversion	.743	.067
A Trait loading	.519	.163	Feeling	.718	.124
C Trait loading	.560	.132	Judging	.742	.156
S Trait Loading	.636	.125			
O Trait Loading	.166	.313	Intuition	.504	.124
E Method loading	.257	.034	Extraversion	.226	.011
A Method loading	.188	.143	Feeling	.184	.018
C Method loading	.189	.143	Judging	-.007	.002
S Method loading	.144	.035			
O Method loading	.566	.244	Intuition	-.559	.042

Table 5. Correlations of WPT, factor scores from the method factor model, and EOYGPA. Values on the diagonals are reliabilities or coefficients of determinacy for rows representing factor scores. Reliability values were not available for the HVP scores or UGPA.

Scale	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 WPT	21.76	5.23	.745														
2 Big Five E	0.00	0.93	-.117[a]	.932													
3 Big Five A	0.00	0.91	-.040	.163[b]	.909												
4 Big Five C	0.00	0.91	-.208[c]	-.004	.185[b]	.908											
5 Big Five S	0.00	0.95	.071	.065	-.158[b]	-.021	.945										
6 Big Five O	0.00	.087	.234[c]	-.219[c]	-.226[c]	-.057	-.028	.873									
7 Big Five Method	0.00	0.93	.118[a]	.001	-.026	-.131[a]	.049	.075	.932								
8 MBTI Extraversion	0.00	0.94	.036	.708[c]	.114[a]	-.125[a]	.118[a]	-.108	.289[c]	.942							
9 MBTI Feeling	0.00	0.95	-.022	.066	.581[c]	.002	-.203[c]	-.232[c]	-.079	.143	.945						
10 MBTI Judging	0.00	0.95	-.070	-.135[b]	.115[a]	.541[c]	-.162[b]	.095	.073	-.144[b]	-.104	.951					
11 MBTI Intuition	0.00	0.93	.053	.418[c]	.296[c]	-.341[c]	.034	-.215[c]	.089	.630[c]	.670c	-.631[c]	.928				
12 MBTI Method	0.00	0.88	-.169[b]	.337[c]	.218[c]	.168[b]	-.044	-.167[b]	-.381[c]	.038	.080	.047	-.052	.882			
13 HVP DIF	73.57	9.82	.218[c]	-.062	.144[b]	-.104	-.018	.066	.015	-.001	.146[b]	-.038	.101	-.022			
14 HVP DIM	86.45	9.05	.076	-.001	.060	.013	.074	.063	.058	.003	.015	-.025	.034	-.049	.502[c]		
15 HVP AIPCT	79.8	19.26	.172[b]	-.063	.023	-.017	.095	.062	.038	.003	-.030	.069	-.042	-.046	.731[c]	.490[c]	
16 UGPA	2.96	0.65	.299[c]	-.044	.085	.111[a]	-.079	.077	-.058	-.062	.058	.205[c]	-.099	.003	.158[b]	-.041	.006

Table 6. Multiple regression of GPA onto WPT, Big Five factor scores, and HVP predictors (left panel) and onto WPT, MBTI factor scores, and HVP predictors (right panel).

Predictor	Standardized Coefficient	p	Predictor	Standardized Coefficient	p
WPT	.324	.000	WPT	.305	.000
Big Five E	.007	.899	MBTI E	-.466	.241
Big Five A	.020	.723	MBTI F	-.451	.326
Big Five C	.199	.000	MBTI J	.691	.095
Big Five S	-.056	.285			
Big Five O	-.021	.698	MBTI N	-.880	.282
Big Five Method	-.058	.265	MBTI Method	.112	.215
HVP DIF	.323	.000	HVP DIF	.339	.000
HVP DIM	-.119	.050	HVP DIM	-.106	.076
HVP AIPCT	-.217	.005	HVP AIPCT	-.259	.001
Multiple R	.429		Multiple R	.452	

Table 7. Multiple regression of GPA onto WPT, Conscientiousness and Judging scale scores, and HVP variables (left panel) and onto WPT, Conscientiousness and Judging factor scores, and HVP variables (right panel).

Predictor	Standardized Coefficient	p	Predictor	Standardized Coefficient	p
WPT	.291	.000	WPT	.310	.000
Big Five C Scale	.014	.813	Big Five C factor	.101	.096
MBTI J Scale	.252	.000	MBTI J factor	.201	.001
HVP DIF	.361	.000	HVP DIF	.360	.000
HVP DIM	-.104	.082	HVP DIM	-.111	.063
HVP AIPCT	-.276	.000	HVP AIPCT	-.268	.000
Multiple R	.448		Multiple R	.453	