



Big Five facets as predictor of job training performance: The role of specific job demands



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ABSTRACT

Personality facets, especially Big Five facets, have been shown to predict learning in school and university. This paper investigates their potential predictive power for training performance in a work environment. Based on trait activation theory by Tett and Burnett (2003) it was expected that depending on specific job demands, specific personality facets would be predictive. However, it was also tested whether invariant influences exist. Additionally, the impact of age, gender, and general mental ability was controlled for. The sample consisted of $N = 501$ apprentices. Training performance was operationalized by supervisor ratings in several learning domains. Findings confirm the hypotheses and revealed invariant positive contributions from dutifulness and Openness to ideas and invariant negative contributions from deliberation and Openness to fantasy. All other facets only functioned within a specific occupational group. Theoretical and practical implications are discussed.

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The idea that specific situational demands and job characteristics influence the way personality affects job performance has been formalized in a theoretical model by Tett and Burnett (2003). Those authors suggested that the activation of personality traits is dependent on certain situational characteristics (i.e., job demands, distracters, constraints, releasers, and facilitators, see below for an explanation). However, job success is often operationalized in terms of supervisor ratings, earnings or hierarchy level. For these criteria empirical evidence for the predictive power of personality traits exists (Barrick & Mount, 1991). Nowadays, though, there is broad acknowledgment that continued learning is a vital part of succeeding in life in general and within the job in particular (Beckmann & Birney, 2012). Whereas some progress has been made regarding the predictive power of personality traits, especially the Big Five, with regard to learning at an adolescent or young adult age within school (Heaven & Ciarrochi, 2012; Ziegler, Knogler, & Bühner, 2009) or university (MacCann, Duckworth, & Roberts, 2009; Poropat, 2009; Ziegler, Danay, Schölmerich, & Bühner, 2010) contexts, little is known about the way personality influences job training processes. To this end the current study systematically investigated the predictive power of Big Five facets for job training in a longitudinal design for different jobs thereby adding to our understanding how individual differences in personality affect the process of training performance.

1. Trait activation through situational characteristics

Tett and Burnett (2003) suggested that trait activation due to situational characteristics can be regarded as an important factor influencing test–criterion correlations in work settings. Consequently, the model can also be applied when investigating the role of personality as a predictor of job training success. Tett and Burnett's *trait activation theory* differentiates five situational features relevant to personality expression and thus relevant to the predictive power of personality at work. (1) *Job demands* can be found within the specific job descriptions and naturally go along with specific personality traits (e.g., finding people to form a study group requires a certain degree of Extraversion). (2) In contrast, *distracters* are not part of the actual job description but interfere with performance (e.g., the presence of other people in a study group might distract a talkative and extraverted person from learning due to chatting). (3) A *constraint* means that the situation does not allow for specific behaviors to be shown and thereby making the impact of the corresponding trait impossible (e.g., an extraverted participant of an online training cannot profit from his/her sociability in learning groups). (4) A *releaser* on the other hand is a situational feature that counteracts a constraint (e.g., the same participant will profit from his/her sociability if the online training includes presence days allowing for making contacts and forming a study group). (5) A *facilitator* underscores trait relevant situation information and makes trait activation more likely (e.g., the present day invitation sent out by the teaching institution might include a note pointing out the opportunity to form study groups). Thus, the work context offers many diverse situations that potentially activate or deactivate a trait and thereby influence its predictive power. Regarding job training the

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same mechanisms can be assumed. There might even be stronger situational influences within job training programs that include formal schooling like in an apprenticeship. Here, work contexts are interspersed with school contexts possibly increasing the variety of situational features.

2. Personality and job performance

At the moment the most popular models of personality are the Big Five (Goldberg, 1990) and the Five Factor Model (Costa & McCrae, 1995). Within these models, five broad personality domains (i.e. Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness) are used to explain individual differences in personality ratings. This framework has successfully been used to predict job performance. While most research looked at job performance in general, some research aimed at investigating the predictive power of the Big Five for job training. Meta-analytical evidence shows that there are some traits that function sufficiently on an overall level, i.e. are predictive of performance regardless of the specific job looked at. Especially Conscientiousness has been shown to predict job performance regardless of specific job demands (Barrick & Mount, 1991). Research investigating the prediction of job training success by personality differences has shown that differences in Conscientiousness, Extraversion, and Openness to experience allow valid learning predictions (Barrick & Mount, 1991). Especially the impact of Openness to experience seems plausible considering its role in models integrating fluid and crystallized intelligence (Ziegler, Danay, Heene, Asendorpf, & Bühner, 2012). At first sight, these findings of cross-situational consistency might be seen as a contradicting trait activation theory.

This impression might change when looking at the predictive power of the Big Five for academic performance. Here it has been shown that narrower facets of the Big Five are much better predictors of academic performance than the broad domains (Bratko, Chamorro-Premuzic, & Saks, 2006; Steinmayr, Bipp, & Spinath, 2011; Ziegler et al., 2010). Personality facets represent less abstract characteristics located below the more global personality domains. Ziegler et al. (2010) could show that compound or cancelation effects on facet level distort test–criterion correlations on domain level. Such compound effects occur if facets within one domain have opposing test criterion correlations. Compound effects offer an explanation for the sometimes seemingly low test criterion correlation of Big Five domain scores. However, they also demonstrate that Big Five facets belonging to the same domain can have opposing effects depending on the specific criterion used. An explanation for this counterintuitive finding might be found within trait activation theory. Thus, applied to the prediction of job training success personality facets not only seem a fruitful option in terms of overall performance. Based on research on academic performance it also seems reasonable to assume that they are more prone to be affected by the mechanisms suggested in the trait activation theory. Another theoretical explanation supporting the claim that facets might be a more optimal predictor of job training is the higher congruence in terms of symmetry (Brunswick, 1955) between personality facets and job training success criteria.

However, little is known about the influence of situational features on the way narrow facets function in job training contexts. Mount and Barrick (1995) could show that specific Conscientiousness facets predict job training. However, this meta-analysis did not include facets from other Big Five domains. Tett, Steele, and Beauregard (2003) could show that personality facets outperform the broader domains as predictors of job performance. Unfortunately, job training was not used as a criterion here. The present study aims to overcome this lack of knowledge by testing the predictive power of all Big Five personality facets as predictors of job training success. Additionally, trait activation theory will be tested by testing whether the prediction achieved by the facets is invariant across diverse jobs and hence job demands.

When it comes to predicting job performance or job training cognitive ability or general mental ability (GMA) has repeatedly been shown to be an outstanding predictor (Schmidt & Hunter, 1998). Recent research showed that specific aptitudes along with general mental ability are also valid performance predictors in job training contexts (Ziegler, Dietl, Danay, Vogel, & Bühner, 2011). Consequently, the present study will not only focus on personality facets but also control for individual differences in cognitive ability.

3. Summary and aims of the present study

As noted above, it has been shown that personality facets are valid predictors of academic performance as measured in schools or universities. However, lifelong learning makes it important that people always learn and thus academically perform outside of these learning environments. So far, little is known regarding the predictive power of personality facets for job training as a specific learning environment that can be considered an important part in each career. The first research question of the present study therefore was whether personality facets predict job training. Based on prior findings we expected substantive predictions for some facets, especially from the domains of Openness and Extraversion. To acknowledge the general impact of cognitive ability, we controlled for its influence, expecting incremental validity for personality facets. Moreover, theoretical as well as empirical arguments show that specific job demands influence trait activation and thus the test–criterion correlations of personality traits. The second research question therefore aimed at testing the invariance of personality facet predictions for job training across different jobs and therefore, job demands and training contents. Considering prior research we expected invariance for the facets of Conscientiousness, Extraversion, and Openness, which are the domains that were all shown to be valid job training predictors.

4. Method

4.1. Participants

The data set included $N = 501$ apprentices and was provided by courtesy of Provalids GmbH (Provalids), a company operating in the pharmaceutical industry. Participants originally applied for and trained in one of four occupational groups: laboratory professions (e.g. chemical laboratory assistants, biology laboratory technicians), skilled production workers (e.g. skilled chemical workers, pharmaceutical production technicians), metal/electronic technicians (e.g. machine operator technician, electrician mechanics) and skilled commercial workers (e.g. office communication assistants, foreign language correspondence clerks). See Table 1 for more information about gender, age distribution, and education level before apprenticeship split for each occupational group.

Table 1
Sample composition.

Occupational group	n	Gender		Age at time of assessment		Prior level of education		
		Female	Male	M	SD	HS	RS	F(Abi)
Laboratory professionals	148	95	53	17.46	1.87	0	59	89
Skilled production workers	117	30	87	17.03	2.09	16	96	5
Metal/electronic technicians	139	4	135	16.65	1.78	9	117	13
Skilled commercial workers	97	63	34	18.21	2.00	2	23	72

Note. M = mean; SD = standard deviation; HS = Hauptschule (secondary general school); RS = Realschule (intermediate secondary school); F(Abi) = (Fach)Abitur (specialized Grammar School; range from lowest to highest level of education in Germany).

4.2. Selection procedure

Apprentices for Provalids are selected in a multistage selection process starting with 6000–7000 applicants. The first selection is based on the written applications and school grades. Applicants who manage the requirements of the first stage are tested with a test battery for GMA, specific abilities and occupational skills (see Ziegler et al., 2011 for a closer description). For the purpose of this study a personality questionnaire was also administered. However, the questionnaire was not used for selection. The final selection of about 400 apprentices each year is based on interviews.

4.3. Measures

GMA was measured with a test differentiating verbal and numerical abilities (Heß, 1994). A detailed description of the GMA test can be found in Ziegler et al. (2011).

The Big Five and their facets were assessed with the German version of the NEO-PI-R (Ostendorf & Angleitner, 2004). In this questionnaire each domain is assessed by 48 items, eight for each of the six facets underlying the domains: Neuroticism, Extraversion, Agreeableness, Conscientiousness and Openness to experience. Items are rated on a 5-point Likert scale from 1 (totally disagree) to 5 (totally agree).

Training success was operationalized by supervisor ratings collected during the first year. Supervisors were asked to rate the apprentices' job training success regarding several aspects, items assessed acquired skills, acquired knowledge, disposition, teamwork, adjustment to work requirements, work quality, will to perform, reliability, learning transfer and an overall rating on a 7-point Likert scale from 1 (very satisfied) to 7 (not satisfied). The items were the same for each individual. While some of the items clearly focus on evaluating job training, other aspects are more general and related to learning attitude. Nevertheless, the items can be viewed as a good operationalization of job training success. To reduce measurement error, participants were rated by their respective supervisors up to five times. The average of these ratings is used as criterion.

For an easier understanding of the results, the supervisory ratings were re-coded before the statistical analysis. Thus, higher values represent better training performance. Descriptive statistics as well as internal consistencies for all variables can be found in Table 2.

4.4. Statistical analyses

Descriptive statistics, internal consistencies, and correlations were calculated with R (2012). MPlus 6.11 (Muthén & Muthén, 1998–2007) was used to test the different models of invariance needed to answer the above stated research questions. All models basically represent

Table 2
Descriptive statistics for all variables.

Criterion	Professional group											
	Laboratory professions			Skilled production workers			Metal/electronic technicians			Skilled commercial workers		
	M	SD	α	M	SD	α	M	SD	α	M	SD	α
Training performance	6.17	.84	^a	5.47	.70	^a	5.54	.83	^a	6.34	.88	^a
Predictors												
GMA	13.66	1.87	.90 ^b	11.68	1.80	.90 ^b	11.74	1.65	.90 ^b	13.44	2.01	.90 ^b
Neuroticism	75.18	16.45	.90	75.05	15.53	.87	70.86	14.31	.85	72.57	14.16	.85
Anxiety	14.61	3.81	.68	14.45	3.70	.61	13.00	3.74	.68	14.18	3.61	.63
Angry hostility	11.14	3.50	.67	11.34	3.68	.63	11.04	3.39	.57	10.88	3.71	.65
Depression	10.53	4.22	.77	11.03	3.96	.67	10.06	3.65	.62	10.19	3.60	.69
Self-conscientiousness	14.43	3.54	.58	14.57	3.59	.51	13.50	3.47	.53	14.21	3.77	.62
Impulsiveness	14.10	3.72	.64	14.20	4.10	.71	13.86	3.47	.59	13.56	3.53	.56
Vulnerability	10.37	3.05	.71	9.45	3.26	.71	9.40	3.05	.69	9.54	2.68	.54
Extraversion	123.56	15.18	.88	121.57	14.59	.84	123.53	14.51	.86	127.60	15.00	.87
Warmth	23.76	2.73	.60	23.07	3.19	.68	23.04	3.08	.68	24.88	2.96	.70
Gregariousness	22.25	4.21	.78	20.92	4.21	.70	21.79	4.00	.69	22.74	4.38	.78
Assertiveness	18.36	3.97	.76	18.26	3.48	.58	18.78	4.07	.77	18.55	4.00	.74
Activity	18.33	2.79	.50	18.38	2.93	.45	18.67	2.57	.36	18.65	2.68	.34
Excitement seeking	17.78	4.27	.59	19.43	4.19	.55	19.47	4.22	.64	19.07	3.82	.43
Positive emotions	23.07	3.62	.72	21.50	4.13	.73	21.80	3.45	.61	23.70	3.89	.75
Openness to experience	118.31	13.53	.83	110.43	12.04	.75	102.87	12.01	.76	116.84	15.34	.85
Fantasy	17.20	4.28	.78	16.49	3.16	.43	15.72	3.17	.49	16.88	4.17	.71
Esthetics	20.47	4.80	.68	18.38	4.67	.67	15.47	4.59	.66	20.11	4.86	.70
Feeling	20.70	3.38	.69	19.44	3.48	.68	18.16	3.20	.61	21.08	3.63	.68
Action	18.88	3.27	.58	17.01	3.22	.41	16.64	2.96	.36	18.70	3.82	.63
Ideas	22.00	3.62	.71	21.48	4.29	.75	19.74	4.20	.75	20.62	4.36	.76
Values	19.11	2.58	.32	17.63	2.62	.33	17.14	2.30	.15	19.45	2.84	.45
Agreeableness	126.05	11.96	.81	124.03	13.79	.84	120.29	14.55	.86	125.70	13.40	.83
Trust	20.51	3.13	.63	19.66	3.50	.64	19.70	3.14	.58	19.80	3.07	.53
Straightforwardness	21.39	3.32	.56	21.09	3.63	.58	19.94	3.52	.55	21.15	3.52	.56
Altruism	24.48	2.59	.60	24.01	3.29	.66	23.54	3.28	.65	24.77	3.05	.65
Compliance	19.23	3.56	.53	19.66	3.08	.25	18.87	3.99	.61	19.26	3.62	.46
Modesty	18.78	3.36	.61	18.19	3.48	.29	17.78	3.43	.65	19.11	3.41	.62
Tender mindedness	21.66	2.67	.52	21.42	3.27	.66	20.46	3.28	.65	21.62	3.24	.59
Conscientiousness	131.81	14.44	.90	130.26	16.89	.91	128.47	15.61	.90	135.62	15.74	.90
Competence	22.36	2.61	.63	21.82	3.25	.67	22.10	2.93	.65	23.06	2.78	.60
Order	20.55	3.40	.61	20.30	3.79	.58	19.98	3.36	.54	21.16	3.78	.65
Dutifulness	24.18	2.83	.62	24.02	3.48	.68	23.66	3.34	.68	24.93	2.74	.54
Achievement striving	21.77	3.23	.65	21.09	3.43	.63	21.01	3.30	.61	22.28	3.58	.70
Self-discipline	23.17	3.64	.79	23.44	3.60	.73	22.78	3.80	.77	24.17	3.62	.78
Deliberation	19.78	3.57	.69	19.58	3.98	.69	18.93	4.15	.78	20.02	4.17	.73

Note. M = mean; SD = standard deviation; GMA = General mental ability. ^aDue to data security no single but only composite scores were obtained and no reliability could be estimated. ^bFor the same reason reliability estimates were drawn from an earlier study in the same company with the same instrument (Ziegler et al., 2011).

regression analyses. Training performance served as criterion in all calculations. The analyses were conducted for each of the Big Five domains separately to avoid multicollinearity. All in all, four models were specified for each of the five personality domains separately.

4.4.1. Basic models

In a first step, for each of the Big Five domains a Basic model was specified. Within this model the personality facets of one domain, age and gender were included into a regression model in order to predict training performance in all occupational groups. All predictors were allowed to correlate. It was assumed that personality contributes significantly to the prediction of training performance across all groups. Age and gender were added as control variables to ensure that the heterogeneous nature of the sample does not distort the findings.

4.4.2. First invariance models

The basic model was then tested for invariance across the four occupational groups for each of the five domains separately. This was done by fixing corresponding paths to be equal across groups. This restriction was not set for age and gender.

4.4.3. Basic models including GMA

The basic regression models were expanded by GMA as an additional predictor for training performance. It was expected that the personality facets retain their predictive power.

4.4.4. Second invariance models

The regression models including GMA were also tested for invariance across the four groups as described above.

4.4.5. Model comparisons

To determine whether the predictive power is invariant across the different job groups, model fit indices (*RMSEA*, *CFI*, *SRMR*) were compared between the basic models and the corresponding invariance models. The basic models represent multiple regression models with zero degrees of freedom. Therefore, model fit is perfect and all fit indices have perfect values (*RMSEA* = 0, *CFI* = 1, *SRMR* = 0). By restraining paths to be equal, degrees of freedom are won and model tests are possible. We then used the cut-off criteria by [Chen \(2007\)](#) for unequally sized groups. This means lacking invariance is represented by an increase in *RMSEA* by .010 or more, or an increase of .025 or more for the *SRMR* along with a decrease of .005 or more for the *CFI*.

5. Results

Table 3 contains test–criterion correlations between all predictors and the rating for job training success. It has to be noted that age and gender differences were partialled out. Generally speaking it can be seen that facets often outperform their corresponding domain scores. Test–criterion correlations overall are small to moderate. As expected, the largest values occurred for Conscientiousness, Openness, Extraversion and their respective facets. Moreover, compound or cancelation effects can be observed. Comparing the results for the different jobs, it can be seen that no facet was a significant predictor across all jobs. For laboratory professionals, higher scores on activity, Openness to ideas, straightforwardness, and dutifulness went along with better training outcome. Skilled production workers benefitted from higher Openness to ideas, compliance, and modesty. Metal/electronic technicians' training performance increased with lower scores on vulnerability, higher scores on tender mindedness, and achievement striving. Finally, lower depression and higher activity and positive emotions increased training performance for skilled commercial workers. However, effect sizes were often comparable across the four job groups. Therefore, we tested whether the predictive validities were invariant.

Table 3
Test–criterion correlations controlled for age and gender differences.

Predictor	Laboratory professionals	Skilled production workers	Metal/electronic technicians	Skilled commercial workers
Neuroticism	<-.01	-.02	-.03	-.02
Anxiety	.02	-.03	-.04	-.03
Angry hostility	-.12	-.07	-.02	.07
Depression	.03	.02	-.03	-.20*
Self-consciousness	.01	.11	.04	-.04
Impulsiveness	.03	.02	.13	.10
Vulnerability	.00	-.15	-.21*	.03
Extraversion	.05	-.13	.06	.17
Warmth	-.05	-.08	.01	.00
Gregariousness	.06	-.12	.00	.15
Assertiveness	.01	-.03	.07	.01
Activity	.17*	-.10	.06	.20*
Excitement seeking	-.01	-.05	.01	.10
Positive emotions	.03	-.13	.11	.25*
Openness	.15	.11	.05	.04
Fantasy	-.04	-.11	-.05	-.05
Esthetics	.15	.02	.01	.16
Feeling	.06	.07	.05	.04
Action	.06	.01	.03	.10
Ideas	.20*	.20*	.08	<-.01
Values	.14	.17	.07	-.18
Agreeableness	.11	.16	.14	-.08
Trust	.04	-.03	.08	.05
Straightforwardness	.19*	.17	.12	-.13
Altruism	.06	.09	.12	-.08
Compliance	-.03	.19*	.04	-.06
Modesty	.09	.19*	.07	-.09
Tender mindedness	.07	.05	.20*	.01
Conscientiousness	.19*	.11	.15	.04
Competence	.10	.10	.09	.15
Order	.14	.12	.11	.09
Dutifulness	.27**	.14	.13	.04
Achievement striving	.12	.04	.20*	.10
Self-discipline	.23	.11	.14	.01
Deliberation	-.01	.02	.01	-.14
GMA	.21*	.41*	-.04	.02

* *p* < .05.
** *p* < .01.

Table 4 includes model fits for all tested models. As can be seen, without controlling for GMA, Agreeableness, Conscientiousness, and Openness facets were invariant predictors of training success across

Table 4
Model fits for all tested model.

Big Five	Model	χ^2 (df)	<i>p</i>	<i>CFI</i>	<i>RMSEA</i> (90% CI)	<i>SRMR</i>
Agreeableness	1	.00 (0)	<.001	1	.00 (.00–.00)	.00
	2	17.20 (18)	.51	1	.00 (.00–.08)	.03
	3	.00 (0)	<.001	1	.00 (.00–.00)	.00
	4	30.26 (21)	.09	.89	.06 (.00–.10)	.04
Extraversion	1	.00 (0)	<.001	1	.00 (.00–.00)	.00
	2	21.99 (18)	.23	.94	.04 (.00–.09)	.03
	3	.00 (0)	<.001	1	.00 (.00–.00)	.00
	4	34.84 (21)	.03	.84	.07 (.02–.11)	.03
Conscientiousness	1	.00 (0)	<.001	1	.00 (.00–.00)	.00
	2	13.94 (18)	.73	1	.00 (.00–.06)	.02
	3	.00 (0)	<.001	1	.00 (.00–.00)	.00
	4	28.87 (21)	.12	.92	.06 (.00–.10)	.03
Openness	1	.00 (0)	<.001	1	.00 (.00–.00)	.00
	2	13.93 (18)	.73	1	.00 (.00–.06)	.02
	3	.00 (0)	<.001	1	.00 (.00–.00)	.00
	4	25.65 (21)	.22	.94	.04 (.00–.09)	.04
Neuroticism	1	.00 (0)	<.001	1	.00 (.00–.00)	.00
	2	24.76 (18)	.13	.91	.06 (.00–.10)	.03
	3	.00 (0)	<.001	1	.00 (.00–.00)	.00
	4	39.17 (21)	.01	.81	.08 (.04–.12)	.04

Note. 1 = Basic model; 2 = Invariance model; 3 = Basic model including GMA; 4 = Invariance model including GMA.

jobs. This was expected for the facets of Conscientiousness and Openness but not Agreeableness. The expected invariance for Extraversion facets could not be found. Additionally, controlling for GMA led to lacking invariance for the facets of Openness. Tables 5 and 6 contain the unstandardized regression coefficients for the just described analyses. We chose the unstandardized coefficients to allow a more straightforward interpretation (i.e. one point up or down on the predictor corresponds with the value of the regression weight up or down on the criterion controlling for all other predictors). Moreover, age and gender differences were controlled for in order to accommodate the heterogeneous nature of our sample. Both variables were responsible for a relatively large percentage of explained variance. None of the Agreeableness facets had a significant and thus, exclusive impact on the criterion. Consequently, invariance across the four jobs can be explained

Table 5
Unstandardized regression coefficients and R² without controlling for GMA.

Domain	Laboratory professionals	Skilled production workers	Metal/electronic technicians	Skilled commercial workers
<i>Agreeableness</i>				
Sex	-.22	-.14	.51	-.03
Age	.20*	.09*	.15*	-.04
Trust	<-.01	<-.01	<-.01	<-.01
Straightforwardness	.02	.02	.02	.02
Altruism	<-.01	<-.01	<-.01	<-.01
Compliance	-.01	-.01	-.01	-.01
Modesty	.01	.01	.01	.01
Tender mindedness	.02	.02	.02	.02
R ²	.25*	.10*	.13*	.02
<i>Conscientiousness</i>				
Sex	-.21	-.13	.67	.01
Age	.17*	.08*	.13*	-.05
Competence	.01	.01	.01	.01
Order	.02	.02	.02	.02
Dutifulness	.03*	.03*	.03*	.03*
Achievement striving	.01	.01	.01	.01
Self-discipline	.01	.01	.01	.01
Deliberation	-.03*	-.03*	-.03*	-.03*
R ²	.27*	.12*	.15*	.04
<i>Extraversion</i>				
Sex	-.21	-.16	.54	-.05
Age	.18*	.09*	.14*	-.04
Warmth	-.05	.01	-.02	-.08*
Gregariousness	.03	-.02	-.01	.03
Assertiveness	-.02	.01	.01	-.03
Activity	.07*	-.02	.01	.05
Excitement seeking	-.02	<.01	-.01	.01
Positive emotions	.01	-.02	.04	.07*
R ²	.28*	.10	.13*	.14*
<i>Neuroticism</i>				
Sex	-.24	-.13	.44	.05
Age	.19*	.09*	.14*	-.03
Anxiety	.01	-.01	-.02	.01
Angry hostility	-.05*	-.02	-.03	.04
Depression	.01	.02	.01	-.10*
Self-conscientiousness	<.01	.04*	.04*	<.01
Impulsiveness	.02	.02	.05*	.02
Vulnerability	.01	-.05*	-.08*	.06
R ²	.26*	.14	.20*	.11
<i>Openness to experience</i>				
Sex	-.23	-.16	.64	-.02
Age	.17*	.08*	.13*	-.06
Fantasy	-.02*	-.02*	-.02*	-.02*
Esthetics	.01	.01	.01	.01
Feeling	.01	.01	.01	.01
Action	<.01	<.01	<.01	<.01
Ideas	.02*	.02*	.02*	.02*
Values	.02	.02	.02	.02
R ²	.25*	.11*	.13*	.03

Note. Domains printed in bold are invariant across the different jobs.
* p < .05.

Table 6
Unstandardized regression coefficients and R² controlling for GMA.

Domain	Laboratory professionals	Skilled production workers	Metal/electronic technicians	Skilled commercial workers
<i>Agreeableness</i>				
Sex	-.24	-.16	.59	-.13
Age	.16*	.06*	.15*	-.03
Trust	<.01	-.01	<.01	.03
Straightforwardness	.06*	.01	.02	-.02
Altruism	-.01	.01	<.01	-.03
Compliance	-.02	.03	-.02	<.01
Modesty	<.01	.02	.01	-.02
Tender mindedness	.01	.01	.05	.02
GMA	.10*	.16*	-.01	.01
R ²	.30*	.29*	.15*	.04
<i>Conscientiousness</i>				
Sex	-.24	-.21	.59	.06
Age	.12*	.05	.13*	-.06
Competence	-.03	.01	-.01	.08
Order	.02	.01	.01	.04
Dutifulness	.06*	.03	.01	-.02
Achievement striving	-.01	<.01	.04	.04
Self-discipline	.04	<.01	.01	-.04
Deliberation	-.03	-.02	-.02	-.06*
GMA	.10*	.16*	-.02	-.01
R ²	.34*	.25*	.16*	.11
<i>Extraversion</i>				
Sex	-.24	-.23	.53	-.06
Age	.14*	.05	.14*	-.05
Warmth	-.04	.03	-.02	-.08*
Gregariousness	.02	-.02	-.01	-.03
Assertiveness	-.02	<.01	.01	-.03
Activity	.08*	-.01	<.01	.06
Excitement seeking	-.02	<.01	-.01	.01
Positive emotions	.01	-.02	.04	.07*
GMA	.10*	.16*	-.02	.01
R ²	.31*	.25*	.13*	.14*
<i>Neuroticism</i>				
Sex	-.28*	-.20	.44	.05
Age	.14*	.06*	.14*	-.03
Anxiety	.02	-.01	-.02	.01
Angry hostility	-.05*	-.02	-.03	.04
Depression	.02	.02	.02	-.10*
Self-conscientiousness	<.01	.03	.04	<.01
Impulsiveness	.01	.02	.05*	.02
Vulnerability	.01	-.05*	-.08*	.05
R ²	.29*	.29*	.20*	.11
<i>Openness to experience</i>				
Sex	-.23	-.23	.55	.01
Age	.12*	.04	.13*	-.03
Fantasy	-.02	-.03	-.01	-.02
Esthetics	.02	<.01	-.01	.04
Feeling	<.01	.01	.01	.01
Action	.01	-.01	.01	.01
Ideas	.03	.02	.02	-.01
Values	.01	.03	.02	-.06
GMA	.09*	.15*	-.03	.03
R ²	.30*	.28*	.13*	.08

Note. Domains printed in bold are invariant across the different jobs.
* p < .05.

by lacking overall impact. The Conscientiousness facets had a significant impact on the criterion across all four jobs. Whereas dutifulness went along with better performance, deliberation decreased training performance. A similar result emerged for Openness. Openness to fantasy had a negative and Openness to ideas a positive effect on training performance across all jobs. The negative impact depression had for the group of skilled commercial workers disappeared when controlling for the other Neuroticism facets. Activity remained a positive training predictor only for laboratory professionals. Due to multicollinearity some suppression effects occurred.

Controlling for GMA, none of the models were invariant. So, in addition to the lack of invariance for some personality facets, GMA did not function invariantly. This is most likely due to the fact that GMA was used within the selection process with different selection cutoffs for the jobs (see Ziegler et al., 2011 for a closer description). Moreover, allowing the regression weights to freely vary across the different jobs generally led to a larger amount of explained variance and more significant predictions. This clearly underscores the influence of job specific demand characteristics. It can also be seen that the lacking invariance for Extraversion was due to differential validities by warmth (skilled commercial workers), activity (laboratory professionals), and positive emotions (skilled commercial workers).

6. Discussion

The present study is the first one investigating the impact of facets from all Big Five domains on training performance within different job contexts. Results clearly show that only few personality facets were invariant predictors across different jobs and therefore training contents and training demands. This is in line with the trait activation theory by Tett and Burnett (2003) outlined above. Moreover, prior empirical results demonstrating cancelation or compound effects were replicated highlighting the need to examine the influence of personality on relevant outcomes on facet level.

6.1. Invariant and variant predictions

Above we hypothesized that Openness, Extraversion, and Conscientiousness facets act as invariant predictors of training performance across different jobs. Our findings confirm these hypotheses for Openness and Conscientiousness but not for Extraversion. Thus, it was mostly the case that specific facets were predictive for specific training contexts. Only for the Conscientiousness facets of dutifulness and deliberation and the Openness facets of fantasy and ideas invariant contributions could be found. In other words, regardless of the specific job, there were job demands that activated these personality facets.

The invariant impact of Openness to ideas and Openness to fantasy can be explained by the fact that the former is often reported to be an important individual difference variable in learning contexts (Ziegler et al., 2012) and closely related to constructs like need for cognition or typical intellectual engagement (Mussel, 2010) which have been found to be predictors of learning (Mussel, Winter, Gelleri, & Schuler, 2011). Thus, the learning context requires this personality characteristic and thereby activates it. The invariant and negative impact of Openness to fantasy seems plausible. This facet describes individual differences in such aspects as daydreaming and following one's own thoughts that clearly detracts from training performance. Thus, the job training demands apprentices to focus and thereby this trait is also activated (in a negative direction). Additionally, the theoretical conception of Openness proposed by DeYoung, Grazioplene, and Peterson (2012) can be used to provide further support for these arguments. DeYoung et al. suggested that Openness can be seen as a continuum combining two large trait complexes, i.e. Intellect on the one side and apophenia (perception of patterns where none exist) on the other. While Openness to ideas can be placed on the Intellect side, Openness to fantasy is closer to apophenia.

The invariant predictions by dutifulness and deliberation are somewhat surprising. The impact of dutifulness most likely can be explained by the fact that apprentices in German companies have to follow a strict schedule to keep up with schooling and on the job training demands. Thus, striving to finish assignments certainly is helpful and these job training characteristics activate the traits. Deliberation on the other hand goes along with characteristics like thinking before acting. It might be that supervisors perceived this behavior as acting hesitantly or not following orders. Obviously, a facet like achievement striving would have been a more plausible invariant predictor at first

glance. However, Ziegler et al. (2009) showed that the impact of achievement striving is moderated by the ability level of the sample. Since ability cutoffs during selection differed between the jobs, it seems reasonable that varying impact of achievement striving occurs.

Unexpectedly, Agreeableness facets were invariant training predictors. However, the generally non-significant regression weights for all facets explain this finding. Looking at the partial correlations in Table 3, it can be seen that some facets are indeed predictive for some jobs. However, controlling for the common core underlying all of these facets, no significant and exclusive predictive power for Agreeableness facets remained. Thus it can be concluded that Agreeableness in general as a domain has a positive impact on job training. This is corroborated by the partial correlations in Table 3.

The fact that some facets were predictive for training performance in some job contexts only shows the need for a clearer understanding of which situational features actually act as constraints or activators of traits. Above we hypothesized that Extraversion facets should act as invariant predictors across the four jobs. However, this was not the case. In fact only some facets were predictive for some jobs. Significant predictions were only found for skilled commercial workers (warmth and positive emotions) and laboratory professionals (activity). Skilled commercial workers have to establish contact with internal and external customers. Persons scoring high on warmth have no problems trusting strangers and find most people likeable. This might be a disadvantage when dealing with customers who might be seeking their own advantage. Positive emotions describe a person who is optimistic and generally happy. These traits might help one to be successful when dealing with customers to establish positive contact.

Within the other jobs contact with strangers is untypical. Thus, in terms of trait activation theory, the work surroundings contain constraints which prevent the effects of certain Extraversion facets to manifest themselves. Laboratory professionals work together closely with scientists. Their job is to set up, conduct, and evaluate experiments. A person higher on activity works with a faster pace reacts fast and is full of energy. These characteristics certainly are advantageous in the described work surroundings. Thus, job demands are in line with the behavior that goes along with these traits.

Another theoretical explanation could be outlined for the negative impact of vulnerability for skilled production workers and technicians. These jobs have higher proportions of males compared with the other two jobs. Thus, it can be assumed that a different culture might reside. Such a male dominated culture might activate behavior due to higher vulnerability (e.g. through crude jokes). This, however, might influence performance ratings negatively.

At this point it should be stressed that all of these explanations were derived post hoc. Findings should be replicated first before more elaborated explanations can be tested. After all, the present study did not set out to test specific influences for specific facets in specific job contexts. Rather than that it was meant to raise awareness for the role of facets as predictors of job training and trait activation theory as a means to explain varying findings.

6.2. Practical and theoretical implications

The finding that only few personality facets were invariant predictors across four job training fields clearly shows that specific job contexts act as constraints or distracters as described by Tett and Burnett. As a consequence, it is vital to clearly analyze the situational context before interpreting test–criterion correlations of personality facets. Unfortunately, besides models describing situational features, little is known about the actual processes. Thus, it seems worthwhile to rehearse interactionism research with a focus on the interplay between specific personality facets and situational features. Otherwise, non-replications of prior findings might simply be due to a different situational context.

From a practical point of view it can be concluded that any student or as in this case apprentice selection based on personality should focus on personality facets which have been shown to be predictive in the specific learning environment selected for.

6.3. Limitations

This study focused on a specific learning context, i.e. apprenticeship. Thus, generalizability to other areas of academic achievement is limited and replications in these fields are needed. Moreover, the sample was selected in part based on GMA leading to range restrictions for some of the groups. This led to the missing invariance of GMA across the jobs. Finally, the context in which data were collected was an applicant setting. Even though personality data were not used for selection, ruling out direct selection effects, indirect selection effects due to the selection based on the interview cannot be ruled out. This would have led to range restrictions as well.

7. Conclusion

Nevertheless, it was the purpose of this study to determine whether personality facets predict academic achievement within a job context above and beyond GMA. This could be confirmed. Moreover, the study aimed at finding out whether those predictions were invariant across different job contexts. In line with Tett and Burnett's trait activation theory, only very few facets proved to be invariant predictors of training performance. Thus, when it comes to predicting academic achievement in a job context using personality facets as predictors, paying attention to the specific situational context in which data are collected seems indispensable.

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