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Original Article

Association between the five-factor model of personality and work engagement: a meta-analysis

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Abstract: The purposes of this meta-analysis were (1) to examine the associations between work engagement (WE) and the personality dimensions of five-factor model and (2) to determine how much variance in WE is explained by these five factors. We performed a database search for studies related to personality traits and WE, and 36 papers that reported correlation coefficients were selected for the meta-analysis. After correcting for publication bias using the trim-and-fill method, conscientiousness had the strongest association with WE (ρ=0.41), followed by extraversion and openness to experience (0.38), neuroticism (−0.36), and agreeableness (0.27). Moreover, 30% of the WE variance could be explained by the five-factor model (R^2=0.33, 95%CI=0.26–0.49) according to a path analysis using the weighted average correlation for unreliability. This proportion was higher than that from a previous meta-analysis of job satisfaction and job performance and was lower than that of personality and WE. Thus, to enhance WE, it is necessary to evaluate both the personality and the psychosocial work environment in detail.

Key words: Five-factor model, Meta-analysis, Personality, Work engagement, Work environment

Introduction

Recently, the focus of studies relating to occupational stress/well-being has shifted from the prevention of negative mental health to the promotion of positive mental health[1–3]. This trend seems to be in line with the so-called positive psychology movement[4–6], a rapidly growing area of psychology since the beginning of the 21st century. One of the important concepts related to this trend is work engagement (WE), which originated and has been expanded globally by researchers in the Netherlands[7]. WE is defined as "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption. Rather than a momentary and specific state, engagement refers to a more persistent and pervasive affective-cognitive state that is not focused on any particular object, event, individual, or behavior"[7]. Currently, WE is frequently used as a positive indicator for activating not only individual workers but also the entire organization[8].

Many studies on occupational stress have examined the improvement of the workplace environment. These studies on job stress are characterized by identifying the association between the workplace environment/job stressors and the mind/body of workers. However, job stress is also known to be associated with individual worker factors (e.g., demographic variables, such as gender, age, and personality), as well as the work environment. For example, in the National Institute of Occupational Safety and Health

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job stress model, which provides a comprehensive framework of the process from job stressors to illness, individual factors are included as buffers[9]. Furthermore, in the job demands-resources model, which is relatively new among occupational stress models[10–12], individual factors are considered personal resources that relate to workplace resources, such as job autonomy and social support. In discussing occupational stress, therefore, it is important to focus on the individual factors of workers in addition to the workplace environment.

Personality traits have often been examined with work-related variables, and the previous studies have reported the usefulness of personality assessment in mental health measures for workers[13–15]. Historically, personality research had begun to determine the general or common psychological traits in humans that were relatively stable and did not change with time or environment by examining the human behavior and emotion[16, 17]. Personality traits reflect pervasive individual differences in emotional style and feelings about oneself, and both have a general influence on emotional responses to features and events in the environment[18].

For emotion, there are two dimensions: negative affect (NA) and positive affect (PA)[19]. NA is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness. In contrast, PA is a dimension reflecting one's level of pleasurable engagement with the environment. High PA reflects enthusiasm, energy level, mental alertness, interest, joy, and determination. These two factors represent affective state dimensions, but they are related to corresponding affective trait dimensions of negative and positive emotionality (individual differences in positive and negative emotional reactivity)[19–21]. At the trait level, NA is a broad and pervasive predisposition to experience negative emotions that has further influences on cognition, self-concept, and world view[20, 21]. Trait PA is a corresponding predisposition conducive to positive emotional experience; it reflects a generalized sense of well-being and competence, and of effective interpersonal engagement[20, 21]. Trait NA and PA roughly correspond to the dominant personality factors of neuroticism and extraversion among five-factor model, respectively[19, 20, 22].

The personality factors have been found to be related not only to general emotions such as NA and PA but also to emotional states experienced by working[14, 23, 24]. For burnout which was defined as a work-related state of mind[25], neuroticism consistently and strongly associated with it[14, 26]. On the other hand, for WE, which has been advocated as an opposite concept of burnout[7], the relationship between personality and it has been discussed as well as burnout. Langelaan *et al.* attempted to distinguish between WE and burnout using personality variables[24]. The results indicated that burnout was characterized by high neuroticism alone, whereas WE was characterized by low neuroticism with high extraversion and mobility of temperament. Additionally, some personality traits were found to be strongly associated with WE than burnout[27, 28]. Iwata *et al.*[29], comparing the factor structure of STAI between Japanese and Western individuals, have suggested that positive emotions in Japanese were largely determined by personality traits. In other words, the relationship between positive emotions and personality seems to vary across cultures. Based on the above, work engagement, which reflected positive emotions in related work, would be strongly affected by workers' personality traits. Therefore, it seemed necessary to estimate the average-level of the relationship between work engagement and personality.

Young *et al.*[30] recently reported a comprehensive meta-analysis specific to the relationships of WE with a wide range of personality measures, such as the five-factor model, positive and negative affectivity, and proactive personality. Young *et al.*'s results[30] reveal that the overall components of these personality traits explain 48.1% of the variance in WE; thus, using personality assessments is recommended as an intervention strategy for enhancing WE. The results are very high compared to meta-analyses that have examined relationships between personality and burnout[14]. Young *et al.*'s meta-analysis[30] provides fruitful evidence for the relationship between personality and WE; it seems to be overestimated because of the overlapping personality concepts used in the analysis (e.g., correlation between extraversion in the five-factor model and positive affectivity).

Accordingly, in the present study, we perform a meta-analysis on the relationships between the five-factor model only and WE again. There are two reasons for selecting the five-factor model among many personality theories. First, the five-factor model is the most widely used personality theory, and there is consensus among personality researchers that this model can measure overall personality[31–34]. Second, before WE originated[7], the associations of job satisfaction and job performance, which are positive indicators related to work, had been examined using a five-factor model[35–38]. Young *et al.*'s[30] meta-analysis does not consider the differences between WE and job satisfaction or job performance in light of the association of the

personality dimensions, although a statistical analysis of the relationships between five-factor traits and WE is conducted.

In this study, we conduct a meta-analysis of the relationship between the five-factor model and WE and examine how this relationship differs from that between the five-factor model and job satisfaction[35, 36] or job performance[37, 38] as previously studied. In addition, we clarify the extent to which the five-factor model alone explains the variance in WE and examine mental health measures related to WE improvement from the perspective of personality theory.

The purpose of the present study is twofold:

1. To clarify the relationship between each subfactor of the five factors and WE and to discuss the characteristics of WE from the perspective of personality theory by comparing job satisfaction and job performance, which have been examined in association with the five-factor model.

2. To determine the extent to which the five-factor model explains the overall variance in WE and to discuss effective measures to improve the WE of workers.

Methods

Literature Search and Inclusion Criteria

Although the engagement at work has been conceptualized variously[7, 25, 39, 40], we focused on the WE concept proposed by Schaufeli *et al.*[7] in 2002, because of its most frequently used in scientific research fields to date[1–3]. Therefore, we searched PsycINFO in December 2020 to retrieve articles published from 2002 to 2020. A combination of keywords related to personality and WE was used in this search. For the five-factor personality model, the keywords "five-factor model", "Big Five", "neuroticism", "extraversion", "conscientiousness", "agreeableness" and "openness to experience" were used. In the database search, we set two search options: (1) peer-reviewed articles in English and (2) the keyword "workers". We retrieved 29 papers for the five-factor model, 60 for the Big Five, 40 for neuroticism, 30 for extraversion, 52 for conscientiousness, 21 for agreeableness, and 22 for openness to experience.

All abstracts of these papers were read to perform the meta-analysis. The inclusion criteria were as follows: (1) the correlation coefficient between a personality trait and WE was reported; (2) WE was measured using the Utrecht Work Engagement Scale[7], which is the most commonly used tool to measure WE; (3) the survey participants were general workers, not a clinical sample (e.g., workers with cancer); and (4) studies simultaneously measured both personality and WE. We excluded studies that reported only correlations between latent variables in the structural equation modeling. These inclusion criteria yielded a total of 36 papers and 125 correlation coefficients. The number of retrieved correlations varied in terms of the factors because all five factors were not necessarily used in the studies.

Coding

We coded the dispositional correlations of WE. Although WE consists of three subscales[7, 8], in the present study, we examine the relationship between the total WE score and personality for the sake of brevity and logical consistency. Therefore, if the correlation coefficients were reported separately for each WE subscale, the mean value of these correlations was entered. Following Kim *et al.*[28], who uses the four subscales of WE, including professional efficacy of burnout, we coded the mean value of the three main subscale correlations after excluding professional efficacy.

Meta-analytic Procedure

To combine the correlations, we used the random effect model, which does not assume homogeneity of effect sizes across studies. The data were combined after the correlation coefficients (r) were transformed to z-values. We used the "metafor" package[41] of R. The weighted average correlations were then calculated using Hunter and Schmidt's method[42], which can correct for artifacts using the reliability coefficient of the measurement scale. However, some of the studies included in this meta-analysis do not report the reliability coefficients of the scales. Following Young *et al.*[30], we used Viswesvaran and Ones' results (i.e., 0.78 for neuroticism, 0.78 for extraversion, 0.78 for conscientiousness, 0.75 for agreeableness, and 0.73 for openness to experience)[43] for the five-factor model and Christian *et al.*'s finding for the WE reliability coefficient (i.e., 0.88)[44].

We computed the weighted average correlation between each personality variable and the WE. To examine the effect of publication bias, we also calculated the value corrected using the trim-and-fill method. Using the estimators R_0 and L_0[45], we estimated the number of studies excluded in this meta-analysis based on asymmetry in a funnel plot. The L_0 indicated that six studies did not publish the correlation between neuroticism and WE; similarly, there was one study for conscientiousness and six studies for openness to experience. Extraversion and agreeableness showed no publication bias. We computed the average effect size by correcting for the publication bias.

Path Analysis using Averaged Effects

Using the weighted average correlations estimated by

Table 1. Meta-analysis for the association of five-factor model to work engagement

	k	*N*	*r*	SE *r*	*ρ*	SE *ρ*	95%CI *ρ*	*Q*	*p*	I^2
Neuroticism	26	15,989	−0.28	0.03	−0.36	0.03	−0.43 – −0.30	203.46	0.00	83.7
Extraversion	26	16,166	0.31	0.04	0.38	0.04	0.30 – 0.47	271.69	0.00	90.1
Conscientiousness	34	18,824	0.33	0.03	0.41	0.03	0.34 – 0.47	225.27	0.00	84.0
Agreeableness	20	12,215	0.21	0.04	0.27	0.04	0.18 – 0.35	145.20	0.00	85.4
Openness to experience	19	10,421	0.25	0.06	0.38	0.07	0.24 – 0.53	459.95	0.00	94.2

Note 1. k=number of correlations; N=total sample size; r=average-weighted correlation; SE=standard error; ρ=average-weighted correlation corrected for unreliability; CI=confidence interval.

Note 2. ρ for neuroticism, conscientiousness and openness to experience represents the corrected values for publication bias.

the meta-analysis, a path analysis was performed to examine how much variance in WE is explained by the five-factor model. The SEM package[46] of R was used for the analysis.

First, of the papers included in this meta-analysis, correlations using all the subscales of the five-factor model were extracted (*k*=18, *N*=10,197). Then, the weighted average correlations between each subscale of the five-factor model were calculated using the random effect model and Hunter and Schmidt's method[42] following the same procedure described previously. Finally, a path analysis was carried out using two types of weighted average correlations: inter-subscales of the five-factor model and between the five-factor model and WE. We also performed a path analysis using the upper and lower limits of the 95% confidence interval (95%CI). A model comprising the path from the five-factor model to the WE and the intercorrelations between factors was used in the SEM. The sample size was set to *N*=10,197.

Results

Meta-analysis on the Association of the Five-Factor Model with WE

The results of the meta-analysis of the association of the five factors with WE are shown in Table 1. For all personality traits, the 95%CI of the mean correlations (*ρ*) do not include zero, indicating that these personality traits are significantly correlated with WE. According to Table 1, conscientiousness has the strongest association with WE (*ρ*=0.41), followed by extraversion and openness to experience (0.38), neuroticism (−0.36), and agreeableness (0.27).

Regarding statistical heterogeneity, the Q statistics across all variables are significantly high. All the I^2 statistics between the five factors and WE are high, suggesting the existence of significant heterogeneity across all personality variables included in this meta-analysis. Among the five factors, openness to experience is very high.

Table 2. Path coefficients of five-factor model to work engagement (N=10,197)

	path coefficient / *β*	95%CI
Neuroticism	−0.16	−0.32 – −0.02
Extraversion	0.17	0.12 – 0.24
Conscientiousness	0.25	0.18 – 0.31
Agreeableness	0.03	−0.06 – 0.10
Openness to experience	0.25	0.14 – 0.37
R^2	0.33	0.26 – 0.49

Path Analysis using Averaged Intercorrelations

The results of the path analysis using the averaged correlation coefficients estimated by the meta-analysis are presented in Table 2. Only the 95%CI of the path coefficients in agreeableness include zeros. The 95%CI of the other path coefficients do not include zero, indicating that the four coefficients are significant. The five-factor model explains 33% of the variance in WE (R^2=0.33, 95%CI=0.26–0.49). Of the five components of personality, conscientiousness and openness to experience are the strongest predictors of WE (*β*=0.25), followed by extraversion (0.17), neuroticism (−0.16), and agreeableness (0.03).

Discussion

Association of the Five Factors with WE

Comparing the meta-analysis of the relationships between job satisfaction and the five-factor model[35, 36] to the present study, two distinct differences are observed between WE and job satisfaction. First, extraversion shows a stronger association with WE than with job satisfaction. Job satisfaction and WE share a positive effect; however, for the former, it refers to a low-intensity effect (e.g., contentment), whereas for the latter, it refers to a high-intensity effect (e.g., excitement)[8]. The difference in the associations between WE and extraversion might reflect the difference in the magnitude of the positive effect.

Second, WE is associated with openness to experience, whereas job satisfaction is not[35, 36]. Our results regarding the association between openness and WE are consistent with those of Schaufeli's study[47]. Openness includes active imagination, preference for variety, and intellectual curiosity[22, 32]. Therefore, individuals with higher openness may be more likely to perceive enjoyment in daily work and experience a sense of significance, enthusiasm, inspiration, and challenge. Additionally, based on the findings of Vaughn *et al.*[48] and Van Beek *et al.*[49], Schaufeli[47] reports that engaged employees are likely to look for growth opportunities and have the disposition to be open to experiences. Accordingly, openness might be associated more with WE, indicating higher activation at work than with job satisfaction.

Since Barrick and Mount's[37] and Hurtz and Donovan's[38] studies revealed that conscientiousness is consistently associated with job performance across a variety of occupations, conscientiousness has been regarded as an important factor that predicts success at work[34]. In addition, the two factors of neuroticism and extraversion are considered to be important factors associated with subjective well-being and life satisfaction, which are positive concepts for life in general[50, 51]. Considering that WE is associated with job performance and well-being[52, 53], conscientiousness, which implies earnestness and planned goal attainment, is an important personality factor associated with WE, along with neuroticism and extraversion.

Variance in WE Explained by the Five-Factor Model

In the present meta-analysis, the five-factor model explains nearly 30% of the variance in WE. This finding is slightly higher than other studies reporting that the five-factor model explains roughly 10%–20% of the variance in job satisfaction[35, 36]. As for job performance, although it has not been reported directly how much the five-factor model explains the variance of job performance in the papers, it could be calculated that it is less than this study from the correlation coefficients (Barrick and Mount, 1991: ρ for emotional stability=0.08, extraversion=0.13, openness to experience=0.04, agreeableness=0.07, conscientiousness=0.22; Hurtz and Donovan, 2001: emotional stability=0.14, extraversion=0.10, openness to experience=0.07, agreeableness=0.13, conscientiousness=0.22)[37, 38]. Furthermore, the results of this study are lower than those reported by Young *et al.*[30], which is nearly half for all personality variables used and nearly 40% for the five-factor model only. Thus, WE seems to be more susceptible to personality than the concepts of job satisfaction and job performance, which have been verified to be associated with personality traits. However, WE and personality might not be as associated, as Young *et al.* argues[30].

Young *et al.* suggests that the use of a personality-based personnel selection system might be effective because a series of intervention strategies that were developed to improve WE have not been effective[30, 54]. However, a five-year longitudinal study by Wu[55] indicates that an increase in time demand for work predicts an increase in neuroticism and a decrease in extraversion and conscientiousness. In addition, it shows that an increase in job control predicts an increase in agreeableness, conscientiousness, and openness to experience. In other words, even if workers are employed using personality indicators related to WE, their personalities may change depending on the work environment. Therefore, it can be said that whether personality indicators related to WE are useful depends on the work environment.

The results of this study show the need to improve WE and evaluate both personality and the psychosocial work environment. Efforts to make job resources abundant for improving WE have led to the use of personal resources related to the WE of workers[56]. Therefore, it is necessary to examine the association between workers' personalities and the psychosocial work environment in the future.

Limitations

This study has some limitations. First, it should be noted that the number of correlation coefficients used in our meta-analysis is smaller than Young *et al.*'s one[30]. Because in the present meta-analysis, the database used to extract the correlation coefficients is PsycINFO only, and published papers were used only in the analysis. In addition, because there are only a small number of correlations between the subfactors of WE and the five-factor model, their relation-

ships have not been analyzed. Second, we could not examine the causal relationship between personality and WE because the studies analyzed in this meta-analysis employ a cross-sectional design. Third, the results of this meta-analysis show that heterogeneity is high in all personality variables, especially in openness. Finally, because no mediation analysis is conducted in this study, other variables may be involved in the relationship between personality and WE.

In this study, by using a five-factor model, we examined the direct relationship between workers' personality and WE. However, Bakker *et al.* reported that, in the job demands-resources model, personality would not only modify the relationship between job demands and stress responses, but also the relationship between job resources and WE[11]. Therefore, to study the modifying effects of personality, such as strengthening or weakening the relationship between job resources and WE, we need to examine the interaction between personality and job resources in the future.

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Appendix Table 1. Selected literatures analyzed in this study

No.	Authors	Year	Journal	Country	Workers / Occupation	n	Correlation Coefficients with WE					Personality Scale・Reliability Estimates						Reliability Estimate of UWES
							N	E	C	A	O		N	E	C	A	O	
1	Langelaan *et al*.	2006	Personality and Individual Differences	Netherlands	various occupations (white- and blue-collar workers)	572	**−0.44**	**0.41**				NEO-FFI	0.82	0.78				0.87
2	Mostert & Rothmann	2006	Journal of Criminal Justice	South Africa	police	1,794	**−0.29**	**0.33**	**0.38**	**0.26**		PCI	0.80	0.71	0.86	0.81		0.89
3	Kim *et al*.	2009	International Journal of Hospitality Management	United States	restaurant chain	187	−0.11	0.09	**0.30**	0.15	0.02	IPIP	0.85	0.86	0.77	0.81	0.80	0.78
4	Halbesleben *et al*.	2009	Journal of Applied Psychology	United States	a federal fire department	80			**0.35**			IPIP			0.89			0.95
5	Halbesleben *et al*.	2009	Journal of Applied Psychology	United States	various occupations (white- and blue-collar workers)	513			**0.35**			IPIP			0.74			0.90
6	Halbesleben *et al*.	2009	Journal of Applied Psychology	United States	hairstylists	251			**0.20**			IPIP			0.91			0.93
7	Joseph *et al*.	2011	The International Journal for the Psychology of Religion	India	catholic diocesan priest	511	**−0.50**	**0.48**	**0.44**	**0.48**	−0.02	NEO-FFI	0.72	0.72	0.81	0.75	0.46	0.89
8	Wefald *et al*.	2011	Journal of Leadership & Organizational Studies	United States	employees and managers of financial institution	382	**−0.26**	**0.39**	**0.33**	**0.40**	**0.27**	BFI	0.79	0.85	0.81	0.79	0.80	0.93
9 *	Rossier *et al*.	2012	Journal of Vocational Behavior	Switzerland	employees	108	−0.21	0.36	0.45	0.22	−0.07	NEO-FF-R	0.87	0.72	0.75	0.78	0.75	0.92
10	Bakker *et al*.	2012	Journal of Vocational Behavior	Netherlands	chemical industry, consultancy and personnel agencies, telemarketing, education, catering service	144			**0.32**			FFPI			0.93			0.84
11	Sulea *et al*.	2012	Career Development International	Romania	public water services and sanitation, food manufacturing, a city hall	258			**0.39**			DECAS Personality Inventory			0.71			0.90
12	Sulea *et al*.	2012	Psihologia Resurselor Umane	Romania	various organization (education, engineering)	223			**0.25**			Mowen's personality scale			0.83			0.80
13	Zaidi *et al*.	2013	African Journal of Business Management	Pakistan	university teacher	399	−0.07	**0.24**	**0.31**	**0.15**	**0.44**	BFI	0.78[a]	0.78[a]	0.78[a]	0.75[a]	0.73[a]	0.88[b]
14	Woods & Sofat	2013	Journal of Applied Social Psychology	United Kingdom	various occupations (mainly white-collar workers)	238	**−0.31**	**0.32**	**0.36**	**0.24**	**0.28**	BFI-V44	0.82	0.83	0.80	0.75	0.78	0.92
15	Brock *et al*.	2013	International Journal of Selection and Assessment	United States	employees	446	**−0.20**	**0.28**	**0.28**	**0.14**	0.06	Goldberg's unipolar big-five markers	0.77	0.81	0.78	0.85	0.76	0.91
16 **	Gan & Gan	2014	Stress Health	China	IT company	160	***−0.20***	***0.21***	0.12			NEO-FFI	0.78[a]	0.78[a]	0.78[a]			0.74
17	Virga *et al*.	2015	Journal of Personnel Psychology	Romania	white-collar (education, IT, other domain)	223	***−0.14***	0.04	**0.29**			Mowen's Personality Scale	0.84	0.80	0.83			0.91
18	Pocnet *et al*.	2015	Swiss Journal of Psychology	Switzerland	Swiss and foreign workers working in Switzerland	618	**−0.27**	**0.29**	**0.29**	**0.11**	**0.21**	NEO-FFI-R	0.83	0.75	0.82	0.68	0.72	0.93
19	Akhtar *et al*.	2015	Personality and Individual Differences	United Kingdom	workers in a wide range of sectors (Education, Technology, Health)	1,050	**−0.20**	**0.24**	**0.20**	**0.12**	**0.31**	TIPI	0.57	0.63	0.47	0.25	0.45	0.90
20	Zecca *et al*.	2015	Revue européenne de psychologie appliquée	Switzerland	French-speaking employees (various occupations)	450	**−0.28**	**0.36**	**0.31**	0.05	0.06	NEO-FFI-R	0.79	0.69	0.76	0.74	0.67	0.92
21	Macsinga *et al*.	2015	The Journal of Psychology	Romania	a regional company of public water services, a manufacturing company and a city hall	258		**0.28**	**0.37**			DECAS Personality Inventory		0.78[a]	0.78[a]			0.90
22	Chinelato *et al*.	2015	Journal of Work and Organizational Psychology	Brazil	lawyers, psychologists, teachers, public servants, secretaries, telemarketing, etc	477	**−0.25**					BFI	0.78					0.93
23	Bickerton *et al*.	2015	Psychology of Religion and Spirituality	Australia	ministers or chaplains, cross-cultural workers, youth workers and others	617	**−0.39**	**0.51**	**0.31**	**0.25**	**0.11**	NEO-FFI	0.86	0.83	0.85	0.76	0.73	0.78

Appendix Continuation of Table 1

No.	Authors	Year	Journal	Country	Workers / Occupation	n	Correlation Coefficients with WE					Personality Scale・Reliability Estimates						Reliability Estimate of UWES
							N	E	C	A	O		N	E	C	A	O	
24	Bayl-smith & Griffin	2015	Journal of Vocational Behavior	Australia	white- and blue-collar workers	465			**0.26**			Goldberg's unipolar big-five markers			0.86			0.93
25 *	Srivastava *et al.*	2015	Information Systems Journal	Multi-national	senior organizational managers	152	−0.13	0.06	0.21	0.11	−0.01	BFI-S, TIPI	0.80	0.78	0.83	0.83	0.77	0.94
26	Ozbilir *et al.*	2015	Applied Psychology	Canada and Turkey	Canada) healthcare, administrative/ support services, finance, accounting Turkey) education/child care, heathcare, advertising	269 (155 Canadan, 114 Turkish)			**0.36**			IPIP			0.82			0.95
27	Schaufeli	2016	Journal of Managerial Psychology	Netherlands	various companies and occupations	1,973	**−0.29**	**0.18**	**0.16**	**0.18**	**0.45**	Mowen's Personality Scale	0.81	0.83	0.87	0.78	0.89	0.91
28	Mróz & Kaleta	2016	International Journal of Occupational Medicine and Environmental Health	Poland	nurse, waitress, receptionist, seller, guide, coach, account advisor	137	−0.15	**0.23**	**0.22**	0.06	0.14	NEO-FFI	0.75	0.75	0.75	0.75	0.75	0.85
29	Lorenz *et al.*	2016	Plos One	Germany	employees, self-employed workers, temporary workers	202	**−0.23**	**0.31**	**0.37**	***0.17***	**0.33**	BFI-S	0.70	0.70	0.55	0.37	0.59	0.95
30 **	Bear *et al.*	2016	Stress Health	United States	delivery driver, lawyer, event planner	509		**0.33**				HEXACO-60		0.81				0.95
31	Zis *et al.*	2016	Neurology	Greece	neurology trainees	113	**−0.25**					NEO-FFI	0.78[a]					0.88[b]
32	Yu *et al.*	2017	PsyCh Journal	China	employees from a petrochemical enterprise	263	**−0.25**	**0.17**	**0.37**	***0.14***	**0.21**	BFI-10	0.60	0.66	0.58	0.56	0.54	0.86
33	Blatný *et al.*	2018	Studia Psychologica	Czech Republic	academic workers	2,229	**−0.24**	**0.16**	**0.23**			BFI-10	0.64	0.51	0.44			0.91
34	Agarwal & Gupta	2018	Personal Review	India	managerial employees	1,302			**0.26**			BFI			0.67			0.88
35	Wojtkowska *et al.*	2018	Current Psychology	Poland	office workers	200	**−0.23**	***0.14***	0.13	0.08	**0.19**	TIPI	0.78[a]	0.78[a]	0.78[a]	0.75[a]	0.73[a]	0.92
36	Burtaverde & Iliescu	2019	Career Development International	Romania	employees from various professional areas (human resources, sales, marketing, administration)	224	**−0.40**	**0.47**	**0.38**	**0.41**	**0.39**	BFI	0.83	0.88	0.83	0.77	0.84	0.93
37	Peng & Tseng	2019	The Journal of Psychology	Taiwan	nurses	234			**0.37**			IPIP			0.95			0.91
38	Sørlie *et al.*	2020	Military Psychology	Norway	leadership candidates of the Norwegian armed forces	2,264	**−0.24**	**0.35**	**0.44**	**0.18**	**0.15**	NEO-PI-3	0.85	0.79	0.86	0.75	0.72	0.88

Note. Bold type correlations are significant at $p < 0.01$. Bold and italic correlations are significant at $p < 0.05$. *: p -value has not been provided. **: at least $p < 0.05$.

[a]Viswesvaran & Ones (2000).

[b]Christian *et al.* (2011).

Appendix Table 2. Average-weighted intercorrelations of five factor personality (N=10,197)

Five factor personality	1	2	3	4
1. Neuroticism				
2. Extraversion	−0.31			
3. Conscientiousness	−0.40	0.25		
4. Agreeableness	−0.35	0.19	0.39	
5. Openness to experience	−0.14	0.36	0.16	0.22