



## 'Old wine in new bottles'? Relationships between overexcitabilities, the Big Five personality traits and giftedness in adolescents



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### ABSTRACT

This study examined the relationship between types of overexcitability (OEs), Big Five dimensions, and giftedness. A sample of intellectually gifted adolescents ( $N = 132$ ) and controls ( $N = 103$ ) completed the OEQ-II and the NEO-FFI. As hypothesized, the gifted scored higher than controls on intellectual OE, imaginal OE, and openness to experience but lower on neuroticism. Contrary to expectations, group-related differences were found for sensual OE, but not for emotional OE. Moreover, SEM analysis showed that giftedness moderated the relation of OEs with openness and extraversion. The relations between sensual OE and openness as well as between psychomotor OE and extraversion were stronger in the gifted than in controls. Relationships between sensual, intellectual, imaginal OEs and extraversion turned out to be significant only in the controls.

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### 1. Introduction<sup>1</sup>

The study was designed to investigate the relationship pattern between five types of overexcitability, the dimensions of the Big Five model of personality and giftedness. The term 'overexcitability' (OE) was introduced by Kazimierz Dabrowski, who created an original concept of personality development, called the Theory of Positive Disintegration. The key idea of the theory is the innate developmental potential which consists of intelligence, specific abilities, the emergence of the inner psychic milieu, and five forms of OE. A strong developmental potential enables an advanced development of gifted individuals. Overexcitability is a tendency to respond in an intensified manner to various forms of stimuli. It is a stronger and more sustained reaction to internal and external stimuli. There are five types of OE: psychomotor (P-OE), sensual (S-OE), intellectual (T-OE), imaginal (M-OE), and emotional (E-OE). General characteristics of the five forms of OE can be described as follows: P-OE – an augmented capacity for being active and energetic; S-OE—enhanced refinement and aliveness

of sensual experience; T-OE—thirst for knowledge, discovery, questioning; M-OE—vividness of imagery, richness of association, fantasies and inventions; E-OE—great depth and intensity of emotional life expressed in a wide range of feelings. Dabrowski noticed, moreover, that the gifted showed a high level of intellectual, imaginal, and emotional OEs (Dabrowski, 1996; Piechowski & Colangelo, 1984).

No study has investigated the correlation between types of OE and dimensions of the Big Five so far. The Big Five model describes five traits: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Each trait refers to the frequency or intensity of a person's feelings, thoughts or behaviors (Costa & McCrae, 1992).

A comparison of the two sets of variables (OEs and Big Five) shows some similarity. First, both have constitutional roots and are the basis of personality development (Dabrowski, 1996; Gallagher, 2013; McCrae & Costa, 2008; Piechowski, 2008). Second, self-report inventories are used for both measurements (Costa & McCrae, 1992; Falk, Lind, Miller, Piechowski, & Silverman, 1999; Piechowski, 2014). Third, several items of the OEQ-II and the NEO-FFI are similar. Gallagher (2013) found a strong similarity in the descriptions of M-OE, T-OE, E-OE, and S-OE with facets of openness to experience (ideas, fantasy, feeling, and aesthetics). A similar conclusion was reached by Wirthwein et al. (2011). Finally, many

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<sup>1</sup> The metaphor 'old wine in new bottles' was used to describe a possible similarity between the Big Five and the types of OE (Wirthwein, Becker, Loehr, & Rost, 2011, p.150).

researchers have focused on the relationship between giftedness/intelligence and OEs or between giftedness/intelligence and dimensions of the Big Five. This raises the question as to the correspondence between OEs and the dimensions of the Big Five.

### 1.1. Overexcitability and giftedness

Piechowski and Colangelo (1984) has suggested that overexcitability may be a good indicator of ability. Types of OE can be measured using qualitative (the Overexcitability Questionnaire, OEQ, Lysy & Piechowski, 1983) or quantitative instruments (OEQ-II, Falk et al., 1999). Findings obtained from the majority of studies confirmed Dabrowski's thesis of the significant role of OE, especially of T-OE, M-OE, and E-OE in the development of gifted individuals (Falk & Miller, 2009).

Researchers also found differences in OEs between gifted adolescents and controls. The intellectually gifted scored higher on T-OE, E-OE, and M-OE (Piechowski & Colangelo, 1984); T-OE, E-OE, and P-OE (Ackerman, 1997); T-OE and E-OE (Bouchet & Falk, 2001); M-OE and T-OE (Piiro & Fraas, 2012; Yakmaci-Guzel & Akarsu, 2006); S-OE, T-OE, and M-OE (Brundzaitė & Gintiliene, 2013; Limont, 2012).

A study of the creatively gifted showed that they scored higher than controls on M-OE (verbal creative test) and P-OE (figural creative test) (Gallagher, 1985), M-OE, E-OE, and T-OE (Chang & Kuo, 2013; Schiever, 1985), and M-OE and T-OE (Yakmaci-Guzel & Akarsu, 2006).

Research also revealed differences in OEs among gifted adolescents with specific abilities. A considerable variation in patterns of OE profiles was found among intellectually, artistically, and creatively gifted adolescents. Moon and Montgomery (2005) reported various patterns of OE in gifted adolescents from different high schools. Students in art school scored highest on P-OE, S-OE, and M-OE; in science school on T-OE; in foreign language school on E-OE. Limont (2012) found that students obtained highest scores on S-OE and E-OE in art school; P-OE in music school; T-OE in school for the academically gifted.

### 1.2. Big Five and giftedness

There have been only a few attempts to examine the differences between the gifted and controls in terms of the Big Five. Specifically, intellectually gifted students scored higher than controls on openness to experience, but lower on neuroticism (McCrae et al., 2002; Zeidner & Shani-Zinovich, 2011).

The question of the association between the Big Five and giftedness can also be approached through measures of intelligence or academic achievement. The results showed a positive correlation between intelligence and openness, and inconsistent or even contradictory for other dimensions of the Big Five (DeYoung, 2011).

Neuroticism is related to intelligence, but the relationship is rather weak; no significant relationship was found for extraversion (Ackerman & Heggestad, 1997). Agreeableness and conscientiousness have a stronger and more consistent relationship with academic achievement, measured as school performance (Asendorpf & van Aken, 2003) or university exams results (Chamorro-Premuzic & Furnham, 2003) than with intelligence.

### 1.3. The present study

The present study aimed to: (1) replicate findings regarding giftedness differences in OE and personality traits in adolescents and (2) examine the relationships between the types of OE, the Big Five dimensions, and giftedness.

The following hypotheses were tested:

**Hypothesis 1.** The gifted will score higher than controls on intellectual, imaginal, and emotional OE.

**Hypothesis 2.** The gifted will score higher than controls on openness to experience and lower on neuroticism.

**Hypothesis 3.** Giftedness will moderate patterns of correspondence between the types of OE and personality traits.

## 2. Method

### 2.1. Participants and procedure

Data was collected from a sample of 270 secondary school students aged 14 to 18, with 135 gifted students ( $M = 16.2$ ,  $SD = 1.2$ ) and a control group of 135 regular students ( $M = 16.1$ ,  $SD = 1.1$ ). The gifted individuals were students at a special school for winners of national competitions in Poland (Limont, 2013). The control group consisted of students attending regular schools, without outstanding academic achievement. The subjects were informed about the general goal and procedure of the study and that their participation was voluntary. Consent for participation was obtained from school authorities and parents. The tests and questionnaires were distributed, completed, and collected during classes. 132 of the gifted (54% female) and 103 of the control group (53% female) completed all four measures. There were no differences between the number of participants in categories based on sex and group (gifted and control)  $\chi^2(1, n = 235) = 0.43$ ;  $p = 0.84$ . Thus, the final sample consisted of 235 (53.2% female) students.

### 2.2. Measures

#### 2.2.1. Intelligence

Two Polish versions of the Raven's Test were used: the Advanced Progressive Matrices (APM, Jaworowska & Szustrowa, 1991) and the Standard Progressive Matrices (SPM, Jaworowska & Szustrowa, 2000). The results in centiles were applied as a verification of assignment to the group. The gifted group consisted of students scoring above the 80 centile on the APM. The control group consisted of students who scored below the 80 centile on the SPM.

#### 2.2.2. Overexcitabilities

Overexcitabilities were assessed with a Polish version of the OEQ-II that consists of 50 items, with 10 for each of the OEs rated on the Likert-scale from 1 (*not at all like me*) to 5 (*very much like me*) (Falk et al., 1999). The alpha coefficients values (Table 1) are only slightly lower than those reported by Falk et al. (1999).

#### 2.2.3. Personality

Personality dimensions were assessed using a Polish version (Zawadzki, Strelau, Szczepaniak, & Śliwińska M., 1998) of the NEO-FFI (Costa & McCrae, 1992) consisting of 60 items, with 12 for each dimension rated on the Likert-scale, from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha coefficients reached an acceptable level (Table 1).

## 3. Results

### 3.1. Data analysis

To test for group differences two mixed design MANOVAs were performed, in which the profiles of OEs and the Big Five were compared in gifted vs. controls. Because of the inter-correlations

**Table 1**  
Descriptive statistics, alpha coefficients values for the gifted and controls, and two MANOVA results (simple effects) for OEs and the Big Five dimensions.

Measure	Gifted, N = 132			Control, N = 103			F(1, 233)	$\eta^2$ /Cohen's d
	M	SD	$\alpha$	M	SD	$\alpha$		
<i>OEs (range 1–5)</i>								
P-OE	3.34	.84	.90	3.35	.71	.81	.004	–
S-OE	3.08	.77	.87	2.87	.77	.77	4.12*	.02/0.27
T-OE	3.67	.62	.79	3.35	.67	.83	16.33**	.07/0.48
M-OE	3.30	.77	.85	2.99	.84	.90	8.70*	.04/0.37
E-OE	3.16	.55	.69	3.24	.75	.83	.92	–
<i>Big Five (range 1–60)</i>								
N	18.20	7.59	.81	22.22	5.57	.67	20.38**	.08/0.72
E	30.93	6.67	.79	31.34	5.56	.66	.25	–
O	28.85	6.01	.66	26.01	5.09	.65	14.92**	.06/0.56
A	28.26	6.01	.73	27.74	5.44	.73	.46	–
C	29.61	6.65	.81	31.01	6.09	.76	2.81	–

Note: OEs—overexcitabilities, Big Five—personality traits, P-OE—psychomotor, S-OE—sensual, T-OE—intellectual, M-OE—imaginational, E-OE—emotional, N—neuroticism, E—extraversion, O—openness, A—agreeableness, C—conscientiousness.

\*  $p < .05$ .  
\*\*  $p < .01$ .

between OEs, path analysis using Structural Equations Modeling (SEM), was performed to test interactions between OEs and group (Tabachnick & Fidell, 2007). In five models all overexcitabilities and their interactions (OE by group) were entered simultaneously as predictors of personality dimensions. The models' parameters and indices of fit were estimated applying the maximum likelihood method. When the best fit model was identified, significant interactions were presented as two standardized regression coefficients ( $\beta$ ) in both groups.

3.2. Group-related differences in OEs and Big Five dimensions

Descriptive statistics (M and SD) for both groups and results of the two mixed design MANOVA's simple effects are presented in Table 1. The main interaction effects are presented below.

The results of MANOVA for OEs were consistent with previous studies, with all possible significant effects for group  $F(1, 233) = 5.20, p < .05, \eta^2 = .02$ , type of OEs  $F(4, 230) = 31.89, p < .001, \eta^2 = .36$ , and for interaction of group and OEs  $F(4, 230) = 8.49, p < .001, \eta^2 = .13$ .

Three types of OE were affected by group membership. The gifted scored higher on S-OE, M-OE, T-OE. Contrary to expectations, no significant group effect was found for E-OE.

The MANOVA results showed significant main effect for the Big Five dimensions  $F(4, 230) = 67.02, p < .001, \eta^2 = .54$  and interaction of group and personality dimensions  $F(4, 230) = 10.46, p < .001, \eta^2 = .15$ , but not for group  $F(1, 233) = 1.90, p > .05$ . The only significant differences were obtained for openness, with the gifted scoring higher than controls, and neuroticism, with the gifted scoring lower than controls.

3.3. Relationship between OEs and Big Five traits in the two groups

To analyze interactions of OEs and group, five path models were constructed with all five OEs, group and interactions between OEs and group as predictors for each personality trait as dependent variables. Path analyses were used in order to control for possible strong correlations between OEs that might create problems in simple regression analyses. Similarly to the strategy used in the regression analysis, after calculating the comprehensive models with all predictors entered, reduced models were calculated with significant predictors only. Then, when interactions were significant, regression analyses separately for both groups were calculated to understand the differences in the relations between OEs and the Big Five traits in both groups.

**Table 2**  
Correlation coefficients of OEs and the Big Five dimensions in the gifted and controls.

Measures	1	2	3	4	5	6	7	8	9	10	
<i>OEs</i>											
1	P-OE	–	.18*	.29**	–.01	.06	–.14	.47**	–.09	.07	.14
2	S-OE	.19*	–	.34**	.45**	.51**	.01	.10	.53**	.29**	.17
3	T-OE	.39**	.63**	–	.29**	.30*	–.08	.10	.34**	.07	.22*
4	M-OE	.17	.65**	.63**	–	.49**	.18	.11	.45**	–.05	–.01
5	E-OE	.29**	.55**	.65**	.66**	–	.31**	.01	.31**	.10	.07
<i>Big Five</i>											
6	N	–.03	.09	–.05	.23*	.31**	–	–.40**	–.03	–.21*	–.22**
7	E	.22*	.30**	.30**	.17	.20*	–.24*	–	.07	.07	.12
8	O	.12	.25*	.20*	.27**	.15	–.09	.21*	–	.12	.03
9	A	–.21*	.03	.12	–.07	.01	–.14	.19	.08	–	.36**
10	C	.12	.12	.23*	–.09	.19	–.29**	.31**	.10	.28**	–

Note: N gifted = 132, N controls = 103, OEs—overexcitabilities, Big Five—personality traits, P-OE—psychomotor, S-OE—sensual, T-OE—intellectual, M-OE—imaginational, E-OE—emotional, N—neuroticism, E—extraversion, O—openness, A—agreeableness, C—conscientiousness, Pearson r above the diagonal are for the gifted, controls below the diagonal.

\*  $p < .05$ .  
\*\*  $p < .01$ .

**Table 3**

A summary of path models predicting the Big Five on the selected types of OE, group, and interaction terms ( $N = 235$ ).

Big Five	Model summary
Neuroticism	$\chi^2(1) = 13.98, p < .001, CFI = .895, RMSEA = .25$
Extraversion	$\chi^2(6) = 33.95, p < .001, CFI = .880, RMSEA = .14$
Openness	$\chi^2(2) = 1.13, p > .05, CFI = .990, RMSEA = .01$
Agreeableness	$\chi^2(4) = 5.08, p > .05, CFI = .990, RMSEA = .03$
Conscientiousness	$\chi^2(8) = 33.00, p < .001, CFI = .869, RMSEA = .12$

### 3.3.1. Correlation coefficients

Table 2 shows Pearson correlation coefficients for all possible pairings on each OE and the Big Five dimensions for the gifted and controls. OEs were significantly (in some cases moderately) correlated in both groups. In both gifted and controls significant correlations were found between OEs and the Big Five factors, most of them in line with the assumption of the moderating effect of giftedness.

### 3.3.2. Path analysis

**3.3.2.1. Parameters of model fit.** In all five models the covariance matrix predicted by the model differed significantly from the observed matrix ( $\chi^2$  values reached significance). Other measures also indicated a very weak fit of the model (all CFI < .55, and all RMSEA > .19).

Similarly to the regression procedures, the following analysis was conducted including only those predictors (OEs, interactions between OE and group) that strongly correlated with the specific Big Five traits. The solutions obtained with the reduced models and the best fit statistics for all the Big Five factors are summarized in Table 3.

The model fit was excellent for openness and agreeableness. In the case of models for the other Big Five dimensions,  $\chi^2$  suggested a weak fit; however, independent of the sample size CFI and RMSEA reached satisfactory values (Kline, 2005). Thus, model fit for neuroticism, extraversion and conscientiousness may be considered acceptable.

**3.3.2.2. Model paths coefficients and regression results for significant interactions.** As far as openness to experience is concerned, S-OE ( $\beta = .17, p < .01$ ) and M-OE ( $\beta = .23, p < .001$ ) predicted openness, and only one interaction, between S-OE and openness, was significant ( $\beta = -.15, p < .01$ ). To understand this interaction, regression analysis was performed. In both groups the relation between S-OE and openness was positive—strong in the gifted ( $\beta = .53, p < .001$ ) and moderate in controls ( $\beta = .25, p < .05$ ).

The pattern of relations between OEs and agreeableness did not differ significantly between the groups (no significant interaction was obtained). Some tendencies were observed only in the case of two interactions, that is, P-OE  $\times$  group ( $\beta = -.12, p < .10$ ) and S-OE  $\times$  group ( $\beta = -.12, p < .10$ ). Despite interaction terms, both S-OE ( $\beta = .29, p < .001$ ) and M-OE ( $\beta = -.19, p < .01$ ) predicted agreeableness.

Similarly, no interaction was a good predictor of neuroticism. However, significant predictors of that trait were group ( $\beta = -.19, p < .01$ ), T-OE ( $\beta = -.27, p < .001$ ) and E-OE ( $\beta = .42, p < .001$ ) independently.

As for extraversion, four interactions were significant: P-OE  $\times$  group ( $\beta = -.20, p < .001$ ), S-OE  $\times$  group ( $\beta = .17, p < .05$ ), T-OE  $\times$  group ( $\beta = .18, p < .05$ ), M-OE  $\times$  group ( $\beta = -.19, p < .01$ ). This means that depending on the group, the extent of the relation between OEs and extraversion, or the occurrence of that relation, would change. As in the case of openness, to get a better grasp on that interaction, regression analysis was calculated with interaction term of group and particular OE. Relations between P-OE

and extraversion in both groups were positive, strong in the gifted ( $\beta = .47, p < .001$ ) while moderate in controls ( $\beta = .22, p < .05$ ). As for S-OE, the relation was positive and moderate ( $\beta = .30, p < .01$ ) only in the control group. In the gifted no statistically significant relation emerged between S-OE and extraversion ( $\beta = .10, p > .05$ ). A similar pattern of relations was observed for T-OE and M-OE. Only in the control group were the relations statistically significant, i.e. positive and moderate for T-OE ( $\beta = .31, p < .01$ ), and positive and weak for M-OE ( $\beta = .17, p < .06$ ). In the gifted the relations were not statistically significant (T-OE:  $\beta = .10, p > .05$  and M-OE:  $\beta = .11, p > .05$ ). An independently significant predictor of extraversion was P-OE ( $\beta = .35, p < .001$ ).

No interaction was a good predictor of conscientiousness. It was found that in this model significant predictors were only group ( $\beta = -.15, p < .05$ ), T-OE ( $\beta = .32, p < .001$ ) and M-OE ( $\beta = -.20, p < .01$ ).

## 4. Discussion

No study has so far tested the extent to which OEs would predict the Big Five traits in gifted or regular adolescents. In general, our results replicated prior findings regarding group-related differences in OEs and the Big Five traits, and they also suggest something about the moderating role of giftedness in the relations between OEs and the Big Five traits.

Analyses revealed group-related differences in intellectual, imaginal, sensual OEs, openness, and neuroticism. As hypothesized, the gifted scored higher on T-OE, M-OE and openness, but lower on neuroticism than controls. Contrary to expectations, group-related differences were found for S-OE, but not for E-OE.

As already mentioned, the existing results regarding OE profiles in gifted adolescents are not always consistent. Also, the significant difference in S-OE and lack of such differences in E-OE between the gifted and controls in our research contradicts the findings of numerous previous studies (Falk & Miller, 2009), but it confirms several others, particularly those focused on intellectually, artistically, and creatively gifted adolescents.

Nevertheless, the lack of difference in E-OE between the gifted and controls might be explained in two ways. First, in the present research the gifted attended a school for winners of national competitions. The pressure to obtain the highest achievement exerted by school and parents might cause the gifted young people to develop emotional coping mechanisms by masking their true feelings in order to meet social expectations (Miller, 2008). Second, examination of the E-OE subscale items e.g., *I worry a lot; I can be so happy that I want to laugh and cry at the same time; It makes me sad to see a lonely person in a group*, shows that these emotions and emotional changes are characteristic of adolescents in general. This may explain the lack of difference in E-OE between gifted and controls.

Taken together, group-related differences in OEs and Big Five traits obtained in our study are congruent with the more general assumption that particular types of OE interrelate in various ways in the context of several factors, such as intelligence, specific abilities, interests and, most importantly, level of personality development (Dabrowski, 1996).

Nonetheless, our results show that giftedness moderated the relation between OEs and two of the Big Five dimensions: openness and extraversion.

Namely, in the gifted the relation between S-OE and openness was stronger than in the controls. This relation might be explained in two ways. First, that the gifted possess undiscovered art/creative ability. Recently Kaufman (2013) using the Openness/Intelligence model (O/I) has discovered that Openness is a strong predictor of creative achievement in the arts. This interpretation also supports

previous findings of a study of the artistically gifted (Limont, 2012; Moon & Montgomery, 2005). Second, one can find strongly similarity in descriptions of S-OE and 'Aesthetics' in O/I model. It can be interpreted that the art/aesthetic needs of the gifted adolescents are a way of searching for new experiences. Although these hypotheses need further testing, our interpretation of this relation shows the importance of S-OE for giftedness.

Regarding extraversion, the situation is somewhat different. P-OE is a good predictor of extraversion in both groups, but the relation was significantly stronger in the gifted.

In adolescence, physical activity is crucial in shaping and maintaining peer relations.

Naturally, at this stage of development, extraversion is expressed in social relations as well as in physical activity (Buss & Plomin, 1984). Considering that in the control group the predictors of extraversion were: P-OE, S-OE, T-OE, it gives a new face to the impulse to explore and engage the world.

We can conclude that in both groups similar patterns of behavior, thinking and feeling serve different purposes and can be interpreted in the light of differences in the developmental paths of the gifted and the controls (Miller, 2008; Piechowski, 2008).

It is worth noting that in the control group generally there were more relations between specific OEs and the Big Five dimensions (two versus four significant relations in the controls and the gifted, respectively). The results can be explained in the context of a more general hypothesis of greater complexity of personality structures in the gifted than in controls (Piechowski, 2008). Numerous studies support this assumption and have shown similar pattern of findings related to inter-correlations between personality dimensions in individuals of superior intelligence (Austin, Deary, & Gibson, 1997).

#### 4.1. Limitations and directions for future research

The present study is not without its limitations. The first limitation relates to the selection of gifted students from a single school, which might suggest that the results refer to a specific gifted group and it is difficult to generalize on them. The second limitation concerns the application of the short version of the NEO-FFI. Using the more extensive NEO-PI-R would allow for a more precise analysis of relations between types of OE and aspects and facets of openness/intellect (DeYoung, 2011; Kaufman, 2013). Finally, it might be necessary to design an adolescent version of the OEQ-II. Up to now several questionnaires have been prepared for the study of adolescent personality, including the Big Five, for example, junior version of the NEO-PI-R (Ortet et al., 2012). No such version exists for the OEQ-II. Great diversity of measurement tools of the Big Five and lack of an upgraded version of the OEQ-II make it difficult to compare results and formulate final conclusions on the structure of personality of adolescents.

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