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## **Personality Complexes in Adolescence: Traits, Interests, Work Values, and Self-Evaluations**

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**Personality Complexes in Adolescence:  
Traits, Interests, Work Values, and Self-Evaluations**

**Abstract**

Following the recent trend in psychology towards a more integrative view of personality, the study attempted to establish the connections and underlying complexes of fundamental personality dispositions within two cohorts of Swiss adolescents in eighth and eleventh grade ( $N = 492$ , ages 13 to 19): Big-Five basic traits, big six vocational interests, work values, and generalized self-efficacy and externality of control beliefs. Five factors were identified which accounted for 60% of variance among the relations of the variables: (1) enterprising-conventional interests, (2) favorable personality dispositions, (3) social-artistic personality characteristics, (4) investigative-realistic interests, and (5) work value endorsement. Cross-sectional findings indicate that particularly agreeableness and conscientiousness become closer related to interests and work values with increasing grade-level.

Keywords: trait complexes, adolescence, personality psychology, personality assessment, vocational behavior

### Introduction

Personality traits, vocational interests, work values, and self-evaluations can generally be considered as some of the most basic aspects of personality. They are key constructs to understand human behavior in many different areas, prominently in career choice and vocational behavior (Brown & Associates, 2002). However, these important constructs have largely been investigated independently and a better understanding of how they are related would promote a more holistic understanding of personality, vocational behavior, and facilitate personality assessment practice (Ackerman & Beier, 2003).

There is also some theoretical ambiguity of how these constructs are related and develop which would merit more integrative empirical research. The prominent theory of vocational interests and personality by Holland (1997) states that interests are a direct expression and specific aspect of personality and research showing significant relations of interests and traits is frequently interpreted as supportive of this assumption (Barrick, Mount, & Gupta, 2003; Larson, Rottingshaus, & Borgen, 2002). Similar accounts were made for values (Roccas, Sagiv, Schwartz, & Knafo, 2002) and core self-evaluations (Judge, Erez, Bono, & Thoresen, 2003). However, others state that interests, values, and self-evaluations are conceptually different from personality traits and emerge from them as adaptations to the specific environment (McCrae et al., 2000). However, almost no studies exist which investigated the relation of these important personality characteristics in adolescence which can be considered a crucial period of their development and stabilization (e.g., Caspi, Roberts, & Shiner, 2005).

The need to investigate relations among these constructs is also evident from the recent trend in personality research to establish underlying traits both between and within basic aspects of personality which is seen as important towards a more holistic understanding of personality (Ackerman & Heggestad, 1997; Digman, 1997; Judge, Erez, Bono, & Thoresen, 2002; Ros, Schwartz, & Surkiss, 1999).

Meta-analyses on the relation of interests and personality traits (Barrick, Mount, & Gupta, 2003; Larson, Rottingshaus, & Borgen, 2002) concluded that the two are distinct enough to be considered different constructs yet share common relations, particularly between artistic interests and openness, enterprising interests and extraversion, social interests and extraversion, investigative interests and openness, and social interests and agreeableness. Realistic interests and neuroticism were generally found to be not significantly related to any personality trait or interest type, respectively. Others identified higher-order dimensions among the two constructs within the three dimensions of (a) interests versus personality traits; (b) striving for accomplishment versus personal growth, and (c) interacting with people versus interacting with things (Mount, Barrick, Scullen, & Rounds, 2005).

Significant relations were also found between traits and values, specifically openness to more openness to change and self-transcendence values; agreeableness to less self-enhancement and more self-transcendence values, conscientiousness to more self-transcendence and conversation values, and extraversion to more openness to change and self-enhancement values (Luk & Bond, 1993; Oliver & Mooradian, 2003; Roccas, Sagiv, Schwartz, & Knafo, 2002). Studies which focused on the relation of traits and work values reported that extraversion, agreeableness, and openness were positively related to intrinsic work values, neuroticism was positively related to extrinsic work values, and conscientiousness was positively related to higher endorsement of work values in general (Furnham, Forder, & Ferrari, 1999; Furnham, Petrides, Tsaousis, Pappas, & Garrod, 2005).

Interests and values showed relations between conventional interests and conservation (positive) and openness to change and self-transcendence values (negative); enterprising interests and values of self-enhancement (positive) and self-transcendence (negative); social interests and more self-transcendence values; artistic interests and openness to change and self-transcendence (positive) and conservation values (negative), and no relation of realistic interests and values (Sagiv, 2002). Investigative and artistic interests were positively related intrinsic work values, and social interests were negatively and enterprising interests positively related to extrinsic work values (Rottinghaus & Zytowski, 2006).

Despite these many studies, almost no findings are available with samples in adolescence and no study simultaneously investigated interests, work values, personality traits, and core self-evaluations to assess their communalities in this important time period. The present study investigated these relations among two groups of adolescents in eighth and eleventh grade. It was expected that the above cited relations among traits, self-evaluations, interests, and work values would also be found in the present sample of adolescents. It was further expected that that a personality factor with neuroticism (inversed), agreeableness and conscientiousness would emerge which resembles Factor Alpha found by Digman (1997) and that core self-evaluations in terms of generalized self-efficacy and perceived control would also show their strongest loadings on this factor (cf. Judge, Erez, Bono, & Thoresen, 2002). It was also expected that different factors for vocational interests and for work values would emerge. Extraversion and openness were expected to be integrated into specific interest factors, for example, extraversion into an enterprising-social factor and openness into an artistic-investigative factor. The study also assessed possible differences in the underlying constructs between students in eighth and eleventh grade which could be an indicator of developmental patterns of higher-order factors of personality. However, since no similar prior research was available, it was expected that these two groups would not differ in the underlying factor structure of the assessed constructs.

## Method

### Subjects

Participants came from five secondary schools, one general high-school, and three vocational high-schools in a rural area of the German speaking part of Switzerland. Of the 492 students 58.9 percent were female (5 students did not indicate gender), 82.3 percent had a Swiss nationality the others had other nationalities mainly from South-Eastern Europe. The age of the participants ranged between 13 and 19 years ( $M = 15.8$ ,  $SD = 1.6$ ). Fifty-five percent (271 students, 52% female, 82.7% Swiss, ages 13 to 17,  $M = 14.6$ ,  $SD = 0.7$ ) attended the eighth grade in mandatory secondary school. The other 221 (45%, 67.4% female, 81.9% Swiss, ages 16 to 19,  $M = 17.4$ ,  $SD = 0.9$ ) attended eleventh grade in vocational high school (63.9%) where they were trained in a specific vocation ( $n = 85$  office clerk;  $n = 37$  retail salesman/woman;  $n = 16$  assistant nurse) or general high-school (36.1%) which prepared for later college education. Five students in this group did not correctly indicate their specific education.

### Measures

**Personality traits.** Neuroticism (emotional stability), extraversion, agreeableness, openness, and conscientiousness were assessed with the official German language adaptation of the NEO-FFI (Borkenau & Ostendorf, 1993; Costa & McCrae, 1992). The scale consists of 60 statements (e.g., "I am not easily worried") which can be evaluated within five categories, ranging from *strongly disagree* to *strongly agree*. The authors of the scale provide compelling support for its factor structure, reliability and construct validity in terms of correlations to other established personality inventories. Roth (2002) concluded the inventory can also be rightfully applied to young adolescents yet recommended a somewhat restricted set of items. Based on the recommendations of these and other scale evaluation studies (e.g., Lüdtke, Trautwein, Nagy, & Köller, 2004) a 4-point Likert scale was applied instead of the original 5-point scale, where the middle answer-category *neutral* was excluded. Also, some items were excluded from the questionnaire since they showed very unsatisfactorily factor loadings and item-intercorrelations among adolescents in these scale evaluation studies. The obtained mean reliability coefficients (Cronbach's Alpha) for the whole sample were .78 for neuroticism, .73 for extraversion, .55 for openness, .69 for agreeableness, and .78 for conscientiousness.

**Vocational interests.** *Realistic, investigative, artistic, social, and conventional interests according to Holland's (1997) theory were assessed with the Revised General Interest Structure Test (AIST-R; Bergmann & Eder, 2005) which is the best established and the most frequently used interest inventory in German speaking countries. The inventory consists of 60 items describing different activities*

in one of Holland's (1997) six interest domains. Students have to indicate their interests in these activities on a 5-point Likert scale with answers are ranging from not at all interested to very interested. The authors of the inventory provide positive evidence for the inventory's construct and criterion validity, e.g., differences between people employed in different vocations, and significant relations to other interest inventories and report one month retest stabilities of .85 to .92. Within the present sample, the reliabilities (Alpha) of the RIASEC scales were R: .89, I: .85; A: .84, S: .91, E: .88, and C: .86.

**Work values.** A list of 10 different work values was presented to the students and they could indicate for each value on a four point scale whether the value is not important to very important regarding their current and/or future work. Based on the framework provided by Ros et al. (1999) the ten values were assigned to groups of extrinsic (high income, leisure time besides work, easy/fast entry into job, and job security), intrinsic (independence at work, variety at work, doing a work which corresponds to one's interests), prestige (prestige, leadership), and social work values (helping other people). A confirmatory factor analyses showed that this theoretically derived assignment provided an acceptable fit to the data,  $\chi(29) = 97$ ,  $p = .000$ ; CFI = .892; SRMR = .05; RMSEA = .070 (90% CFI .055 - .085). Reliabilities (Alpha) were .61 for extrinsic, .54 for intrinsic, and .48 for prestige work values, respectively.

**Core self-evaluations.** Generalized self-efficacy (GSE) and externality of control beliefs were both measured with the Inventory for the Measurement of Self-Efficacy and Externality (FKK; Krampen, 1991) which is a well-established questionnaire for research in the German speaking countries. Both concepts are measured with 16 items each (e.g., "I can determine very much of what happens in my life") and students are asked to indicate on a 6-point Likert scale how much these statements apply for themselves, ranging from *very wrong* to *very true*. Support for the inventories content and criterion validity is provided for adolescents in terms of significant relations to different personality traits, psychological disorders, or well-being measures where higher scores of GSE and lower scores of externality are positively related to favorable characteristics on these measures (Krampen, 1991). The internal consistency (Alpha) within the present sample was .70 for GSE and .86 for externality of control.

## Procedure

Teachers and directors of the schools selected to participate in the research project were contacted and asked whether they would participate with their classes in the study. Students and their parents/guardians were then informed about the general nature of the study some weeks prior to data collection. All students attending class at the day of data collection completed the questionnaires. All measures were completed in their classes under the supervision of their classroom teachers during an ordinary school lesson.

## Results

To make the scales comparable for the factor analysis with a parallel test, all scores were standardized to mean-scores (sum-score divided by number of items). The interest and core self-evaluation scales were linearly transformed to a 1 to 4 scale to make them equal to the other scales. Table 1 presents the bivariate Pearson correlations among the assessed constructs, with a Bonferroni adjustment for significance due to the large number of correlations calculated (136 pairs).

[Insert Table 1 about here]

An exploratory factor analyses with principal axis factoring (PAF) and Promax rotation was applied to extract underlying factors of the assessed constructs. Promax rotation has the advantage of being able to account for both orthogonal and correlated factors, depending on the actual data and is often considered as the most favorable rotation method for factor extraction (Kahn, 2006). A parallel test (Horn, 1965) was then applied to estimate the optimal number of underlying factors. Of the six initially

extracted factors with an Eigenvalue > 1 all had an above random Eigenvalue (Eigenvalues > 1 obtained: 2.90, 2.36, 2.06, 1.59, 1.25, and 1.10; random Eigenvalues: 1.38, 1.25, 1.22, 1.20, 1.15, 1.09). However, the Kaiser's criterion to retain factors with Eigenvalue > 1 is not applicable for PAF (Kahn, 2006), and factor six was only slightly above the random value. Also, the subsequent analyses among the two cohorts as presented below clearly showed only five factors in each subgroup. Based on these findings I decided to favor a solution with five factors (the six-factorial solution would have resulted in the same basic dimensions with the difference of a separation between a social-agreeable and an artistic-openness factor). Table 2 presents the obtained factor structure for the exploratory analyses for the five factors which together explained 59.8% variance among the assessed constructs (Kaiser-Meyer-Olkin Index = .638; Bartlett's Test of Sphericity  $\chi^2(136) = 2058.4$ ;  $p < .001$ ). As can be seen from Table 2, Factor 1 encompassed enterprising and conventional interests, Factor 2 neuroticism (inversed), extraversion, agreeableness, conscientiousness personality traits and the two core self-evaluation traits. Due to their nature this factor could be labeled "favorable personality traits" which is defined as being emotional stable, extraverted, agreeable, conscientious, and having high internal control beliefs and high generalized competency beliefs. Factor 3 could be labeled "social-artistic personality" encompassing social and artistic interests, social work values, and openness. Factor 4 encompassed investigative and realistic interests and Factor 5 could be labeled "work value endorsement" and encompassed high scores on extrinsic, prestige, and intrinsic work values. Only social interests had a cross loading on another factor of >.40 with its relation to the enterprising-conventional interests factor. Among the other variables agreeableness was also comparatively highly related to social-artistic personality, and conscientiousness had an almost equally strong loading on work value endorsement as it had on its main factor favorable personality traits, indicating that not all factors were completely distinct. The correlations among the factors in Table 2 show that almost all factors were significantly related.

[Insert Table 2 about here]

**Cohort differences.** The same exploratory factor analysis procedure was applied for the cohort in eighth and eleventh grade separately. Within both groups the Parallel-Test indicted a clear five-factorial structure. The same basic pattern of factors as found in the whole sample emerged within both cohorts and within the younger group all variables belonged to the same factors as for the whole sample reported above. However, for the older group some notable differences emerged for the belonging of some traits within different factors. For students in eleventh grade, agreeableness joined the factor social-artistic personality with social and artistic interests and social work values while conscientiousness belonged to the work values endorsement factor with extrinsic, intrinsic, and prestige work values. Openness belonged to the investigative-realistic interest factor for this group. Also, some large cross loadings emerged within this group for some traits: extraversion also loaded strongly (.47) on the social-artistic personality factor, and agreeableness also loaded (-.50) on enterprising-conventional interests.

### Discussion

The goal of the present study was to establish the relationships of some of the most fundamental personality characteristics in a group of students in adolescence: personality traits, vocational interests, work values, and core self-evaluations. Although there has been research on the overlap of some of these constructs, no study thus far examined all of them simultaneously and almost no studies on their relations are available for adolescents – a time period which is crucial in developing these traits. Following the recent trend in personality psychology to establish underlying factors and trait complexes among previously largely independently studied aspects of personality (e.g., Ackerman & Heggestad, 1997) the main goal of the present study was to determine what underlying personality complexes constitute these diverse personality measures.

### **Relations among the Constructs**

The results of the study imply that the basic relations of personality traits and interests, which were established mainly with college students and adults, can also be found already in early and middle adolescence. These same is true for the less investigated relations among interests-work values, traits-work values and core self-evaluations to interests and to work values. However, some notable deviations from the expected findings are worthwhile to mention: First, the study not only found positive relations between traits and interests but also equally strong negative ones. For example, extraversion was negatively related to realistic and investigative interests and social work values were negatively related to realistic interest. These relations make theoretical sense. However, the notion that certain personality traits or values not only promote specific interests but equally well inhibit some others has not received much attention in the literature. Another interesting finding is that generalized self-efficacy beliefs were positively related to more interests in different areas (enterprising, conventional, investigative and to a lesser degree realistic and social). This implies that while task specific self-efficacy beliefs are predictive of specific interests (Lent, Brown, & Hackett, 1994) a generalized competency belief could be related to interest development in different areas, possibly mediated through more task specific efficacy-beliefs.

### **Personality Complexes**

The results of the factor analysis suggested that five basic personality complexes underlie the assessed variables: enterprising-conventional interests, favorable personality traits, social-artistic personality, investigative-realistic interests, and work value endorsement. These factors suggest that traits, interests, and work values form related yet separate factors in adolescence. The specific relation among the pairs of interests support Gati's (1991) hierarchical model of vocational interests versus a true hexagonal model as implied by Holland (1997). Within the personality traits, the study could not find the expected factors Alpha (socialization, stability) and Beta (personal growth, plasticity) (DeYoung, 2006; Digman, 1997). However, the finding of a rather broad personality factor is in accordance with the assumption of a Big-One factor in personality (Musek, 2007) and should not just be explained by artificial social desirability in item response. Also, the fact that neuroticism and extraversion consistently represented this positive personality factor is consistent with the many studies showing their strong relations to positive and negative affect and general well-being (Steel, Schmidt, & Shultz, 2008). The finding that the two self-evaluations also belonged to this factor is also in accordance with previous research (Judge, Erez, Bono, & Thoresen, 2002).

A notable exception is the trait openness which did not belong to the personality complex but was clearly related to specific interests and work values, namely artistic and social interests and social work values. These relations are in accordance with previous findings (Barrick, Mount, & Gupta, 2003; Larson, Rottingshaus, & Borgen, 2002) and underscore the potential uniqueness of openness among the Big-Five (García, Aluja, García, & Cuevas, 2005).

From a developmental perspective, the cross-sectional findings on cohort differences imply that traits build stronger relations to interests and work values as adolescents get older and increase in grade-level. The findings imply that specifically the three less affective, more intellectual traits of openness, agreeableness, and conscientiousness become increasingly stronger related to vocational variables while neuroticism and extraversion continue to primarily indicate a positive personality disposition. Clearly, longitudinal research would be the preferred method to further assess these claims.

### **Limitations and Conclusions**

Several limitations should be addressed in interpreting the results of the present study. First, the measure for work values was not a well established inventory and due to the small number of items per scale had only restricted reliabilities. Future studies should thus try to replicate these findings with other work value measures. Another critical issue, which also applies to most other studies in this area, is that only self-report scales were applied. This limits the validity of obtained correlations due to a

methodologically shared variance which is not intended to be measured. Finally, although the sample was clearly more heterogeneous than those in most studies consisting of college students of one or two majors, at the high-school level not all vocational fields were represented. Specifically, no students in a vocational education and training with a realistic focus were included in the sample which could have resulted in some distractions of the found relations among the measures.

For theory development the results could imply that interests and work values form different entities from traits (and self-evaluations) particularity in early adolescence and simply considering them as specific aspects of personality traits seems inappropriate for this age group. However, during adolescence, as students increasingly gain the possibility to choose their own environments and activities, these different characteristics could subsequently guide the selection of certain activities and environments over others – both in terms of attraction and rejection. The resulting learning experiences could then reinforce interests and values and lead to an increasingly close connection of (particularly the more intellectual) traits to specific vocational interests and values.

For practice the results imply that personality assessment can benefit from a personality-complex approach. Rather than having to take into account 17 different variables and over 130 possible relations among these single constructs, practitioners can focus on five personality complexes and their relation to each. Such an approach could also enrich our understanding of adolescent career choice and career development and simplify counseling approaches which attempt to help students choose suitable vocational and educational futures which are in accordance with some of their most basic personality characteristics.

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Table 1. Bivariate Pearson Correlations Among the Assessed Variables (N = 492)

	1	2	3	4	5	6	7	8	9	10	11
1 Neuroticism	-										
2 Extraversion	-.387*	-									
3 Openness	.020	.221*	-								
4 Agreeableness	-.254*	.344*	.096	-							
5 Conscientiousness	-.181*	.097	-.003	.245*	-						
6 Self-efficacy	-.386*	.293*	-.009	.097	.225*	-					
7 Externality	.431*	-.204*	-.090	-.222*	-.190*	-.222*	-				
8 Realistic	-.073	-.164*	-.152*	-.134	-.041	.145	.139	-			
9 Investigative	-.027	-.206*	.076	-.135	-.015	.186*	.061	.588*	-		
10 Artistic	.095	.077	.283*	.093	-.001	.047	.056	-.105	.143	-	
11 Social	.108	.247*	.211*	.197*	.026	.108	-.047	-.192*	.042	.439*	-
12 Enterprising	-.114	.261*	.142	-.148	.008	.284*	-.070	.090*	.167*	.295*	.493*
13 Conventional	-.053	-.004	-.025	-.142	.065	.233*	.078	.299*	.360*	.153	.275*
14 Extrinsic Values	-.035	.144	.014	.003	.119	.087	-.001	-.041	-.060	-.007	-.050
15 Intrinsic Values	-.105	.249*	.157	.130	.210*	.077	-.079	-.095	.014	.138	.049
16 Prestige Values	-.112	.225*	-.055	-.040	.232*	.135	-.018	-.014	-.042	-.017	.016
17 Social Values	.123	.252*	.103	.285*	.122	-.031	.062	-.163*	-.094	.195*	.415*
<i>M</i>	2.35	2.77	2.14	2.88	2.87	2.72	2.32	2.07	2.17	2.42	2.58
<i>SD</i>	0.45	0.37	0.48	0.34	0.38	0.30	0.43	0.66	0.62	0.63	0.70

Table 1. (continued)

	12	13	14	15	16	17
1 Neuroticism						
2 Extraversion						
3 Openness						
4 Agreeableness						
5 Conscientiousness						
6 Self-efficacy						
7 Externality						
8 Realistic						
9 Investigative						
10 Artistic						
11 Social						
12 Enterprising	-					
13 Conventional	.657*	-				
14 Extrinsic Values	.040	.053	-			
15 Intrinsic Values	-.012	-.101	.371*	-		
16 Prestige Values	.209*	.137	.402*	.256*	-	
17 Social Values	.014	-.033	.048	.207*	.101	-
<i>M</i>	2.56	2.24	3.04	3.29	2.76	2.97
<i>SD</i>	0.62	0.58	0.50	0.50	0.62	0.86

Note. \* significant after Bonferroni adjustment

Table 2. Pattern and Structure Matrix for the Five Retrieved Factors with Principal Axis Factoring and Promax Rotation (n = 455)

Variables	Factors (Pattern Matrix)					Factors (Structure Matrix)				
	1	2	3	4	5	1	2	3	4	5
Enterprising	<b>.950</b>	.079	.129	-.089	.004	<b>.953</b>	.169	.292	.084	.091
Conventional	<b>.662</b>	-.018	.007	.204	.045	<b>.708</b>	.018	.057	.345	.047
Neuroticism	-.042	<b>-.846</b>	.241	-.049	.047	-.070	<b>-.785</b>	.095	-.040	-.153
Extraversion	.092	<b>.454</b>	.205	-.203	.155	.108	<b>.561</b>	.373	-.281	.341
Externality	.020	<b>-.557</b>	.028	.057	.106	.006	<b>-.525</b>	-.069	.095	-.053
Self-Efficacy	.221	<b>.475</b>	-.039	.154	.070	.281	<b>.487</b>	.059	.162	.194
Agreeableness	-.302	<b>.406</b>	.351	.000	-.060	-.233	<b>.436</b>	.376	-.173	.104
Conscientiousness	-.061	<b>.250</b>	.057	.066	.229	-.016	<b>.317</b>	.119	-.002	.302
Social	.326	-.047	<b>.745</b>	-.055	-.131	.407	.080	<b>.771</b>	-.129	-.004
Social Values	-.128	-.091	<b>.543</b>	-.046	.152	-.065	.051	<b>.544</b>	-.197	.215
Artistic	.122	-.118	<b>.542</b>	.103	-.022	.210	-.024	<b>.510</b>	.024	.029
Openness	-.031	.040	<b>.376</b>	.042	-.031	.031	.096	<b>.365</b>	-.047	.038
Investigative	.013	-.002	.195	<b>.971</b>	-.012	.252	-.054	-.017	<b>.933</b>	-.067
Realistic	.086	.028	-.209	<b>.582</b>	.013	.187	-.054	-.316	<b>.643</b>	-.063
Extrinsic Values	.018	-.097	-.089	-.026	<b>.680</b>	.019	.085	.014	-.055	<b>.641</b>
Prestige Values	.219	-.006	-.114	-.063	<b>.621</b>	.212	.170	.031	-.045	<b>.614</b>
Intrinsic Values	-.185	.043	.222	.099	<b>.535</b>	-.111	.219	.273	-.041	<b>.569</b>
Eigenvalue						2.90	2.36	2.06	1.59	1.25
% Variance						17.05	13.86	12.14	9.37	7.38
Factor 1										
Factor 2						.095*	-			
Factor 3						.198***	.199***	-		
Factor 4						.224***	-.097*	-.215***	-	
Factor 5						.052	.350***	.190***	-.110*	-

Note. Strongest loadings on each factor are printed in **bold**

\*  $p \leq .05$ ; \*\*  $p \leq .01$ ; \*\*\* $p \leq .001$  (Pearson correlations)

