

**NONCOGNITIVE CORRELATES OF EDUCATION**

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### Abstract

Native-born Estonian men ( $N = 1495$ ), 18-23 years old, participated in a study on relationships between the level of education and noncognitive characteristics of mind (so-called Characteristic Adaptations: attitudes, values, self-concept, etc.). In addition to Characteristic Adaptations, the model included parents' level of education, personality dimensions, cognitive ability, and word meaning structure variables that may mediate the relationships between the level of education and Characteristic Adaptations. It was found that, after the effect of background variables on the dependent variables was taken into account, the level of education was still related to noncognitive constructs in the model (collectivism, coping style, aggression, attitudes towards alcohol and narcotics, and self-esteem). Higher level of education was related to adaptive noncognitive characteristics of mind.

### **Noncognitive Correlates of Education**

Along with knowledge and skills, attitudes and values are integral parts of National Curricula for several countries, such as, for example, England (National curriculum online, n.d.), New Zealand (The New Zealand curriculum framework, n.d.), Sweden (Skolverket, n.d.), and Estonia (Põhikooli ja gümnaasiumi riiklik õppekava, 2004). Usually attitudes and values in curricula are related to the development of self, relationships, and society. So, formal schooling should be associated with the attitudes and values promoted by curricula. Indeed, it is possible to find many studies where relationship between the level of education and attitudes and values are reported. In other studies, the same attitudes and values, however, are associated with personality and intelligence, the characteristics of mind that are, theoretically, immutable to social-cultural environment in general and to the system of education in particular. To some degree, the level of education is also related to personality characteristics and intelligence. Correspondingly, it is possible that relationships between education on the one hand and attitudes and values on the other hand may arise because both of them are related to personality characteristics and intelligence. We did not find in databases studies where complex relationships between mostly biologically determined personality and intelligence, education, and attitudes and values would have been studied all together.

The Five Factor Theory (FFT) of personality (McCrae & Costa, 1996, 1999) proposes in which way different characteristics of mind and environmental influences may be interrelated. According to FFT personality system is composed of biologically determined Basic Tendencies that together with External Influences (Culture) affect Characteristic Adaptations. Basic Tendencies are five dimensions of personality: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Characteristic Adaptations are all the psychological structures that people acquire in the course of life for getting along

with the world. They include knowledge, skills, attitudes, goals, roles, relationships, schemas, scripts, habits, and self-concept. In FFT self-concept is of special significance, it depends in addition to Basic Tendencies and External Influences also on other Characteristic Adaptations.

For the purposes of this study two modifications were introduced into the FFT. First, Basic Tendencies, by definition, should include in addition to personality dimensions also cognitive ability that is also considered to be mainly biologically determined characteristic of mind.

Second, it was hypothesised that cultural influences are mediated by word meaning structure (WMS). Theoretically, the human mind should be influenced by a cognitive factor, the way in which humans organize the world around them mentally (Toomela, 1996, 2003a, 2003b). Human adults rely heavily on symbols, especially words. Words can be used intraindividually as “psychological tools,” as tools for guiding thinking, memory, perception, emotion, and attention. The WMS may be systematically different in different people because of the way in which word meanings are constructed. In human cultures of today, the most common types of word meaning structures are so-called “everyday concepts” (or “complexes”) and “scientific concepts” (Vygotsky, 1996; Vygotsky & Luria, 1994). These two types of WMS have been differentiated in developmental psychology (e.g., Luria, 1979; Nelson, 1996; Toomela, 2003b), in cultural psychology (e.g., Luria, 1979; Toomela, 1996, 2003a), and in neuropsychology (e.g., Funnell, 2001; Luria, 1979; Toomela, Tomberg, Orasson, Tikk, & Nõmm, 1999). Words of the Everyday Concept type encode information on the basis of perceptual attributes of word referents and on the basis of the observation of events in everyday life; word meanings are tied to immediate sensory experiences. Word meaning is, thus, constrained by the characteristics and contexts of external referents. Words of the Scientific Concept type encode information in the language; the structure of word

meaning is abstract and hierarchical, its structure is formally logical, and it does not depend on the immediate reflection of reality.

In which way dominant type of WMS is related to other characteristics of the mind is not yet fully understood. It is known that the development of the scientific word meaning structure is related to Westernized formal schooling (e.g., Cole, 1996; Cole & Scribner, 1974; Luria, 1974). Theoretically, WMS should also be related to Characteristic Adaptations because WMS characterizes the way of information processing in all psychological processes related to semiotic operations (cf. Vygotsky & Luria, 1994).

In this study Costa and McCrae's FFT is tested in order to understand better the role of education in characteristic adaptations and self-concept. Basic tendencies were assessed by a Personality Inventory and a Cognitive Ability Test. Characteristic adaptations assessed in the study were Collectivism (three facets: Familism, Peers, Patriotism), Coping Styles (Task oriented, Social-Emotional, Avoidance oriented), Aggression (Physical, Verbal, Anger), Attitudes towards narcotics (two measures, one described attitudes and the other described motivation to use narcotics or alcohol). Self-concept was assessed as Self-esteem. In addition, the family background, which includes both biological and cultural influences, was described by the parents' level of education.

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Insert Figure 1 about here

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*The model tested in this study*

In order to differentiate the possible role of education in the individual differences in Characteristic Adaptations it is necessary to rule out effects of confounding variables, especially personality and cognitive ability. The complex model of relationships has to be tested in one step. The main characteristics of the model tested in this study are represented in

Figure 1. Following the FFT, it was assumed that personality dimensions and cognitive ability affect the level of education, Characteristic Adaptations and Self-Concept. The level of education, theoretically, is affected by Basic Tendencies. Thus, it can be assumed that personality dimensions and cognitive ability of siblings is affected by the level of education of their parents. The level of education should affect both directly, and mediated by WMS, other Characteristic Adaptations. Self-concept, in turn, should depend on all other variables in the model.

We did not find support from other studies to this model as a whole. There are, however, many studies that provide support for different parts of this model. First, it has been found that school success is related to personality dimensions (Hair & Graziano, 2003; Huesmann, Eron, & Yarmel, 1987; Lounsbury, Steel, Loveland, & Gibson, 2004; Lounsbury, Sundstrom, Loveland, & Gibson, 2003) and IQ (Kubicka, Matejcek, Dytrych, & Roth, 2001; Watkins & Astilla, 1980). Thus, on the one hand, it should be expected that personality dimensions and cognitive ability predict the level of education of participants. On the other hand, it can also be expected that parents' level of education, in turn, predict participant's personality dimensions and cognitive ability through common biological background of parents and their siblings. It is also known that children's level of education is related to parents' level of socio-economic status (Feldt, Kokko, Kinnunen, & Pulkkinen, 2005) and parents' level of education (Huesmann et al., 1987). Correspondingly, it can be expected that parents' level of education is related to children's level of education as well as to all Characteristic Adaptations, which depend on both biologically constituted personality and cognitive ability and socio-cultural background. On the basis of these findings it was hypothesised that parents' level of education has impact on all other variables in the model.

Next, in addition to the level of education, personality is related to WMS (Toomela, 2003c), collectivism (McCrae, 2004; Realo, Allik, & Vadi, 1997), coping style (Eksi, 2004;

Kallasmaa & Pulver, 2000; Linden et al., 2003), aggression (Ang et al., 2004; Asendorpf & van Aken, 2003; Gleason, Jensen-Campbell, & Richardson, 2004; Martin, Watson, & Wan, 2000; Tremblay & Ewart, 2005), drinking and drug abuse behavior as well as attitudes towards these behaviors (Francis, Fearn, & Lewis, 2005; Kubicka et al., 2001; Lemos-Giraldez & Fidalgo-Aliste, 1997; Loukas, Krull, Chassin, & Carle, 2000; Malouff & Schutte, 2002; Sher, Bartholow, & Wood, 2000), and self-esteem (Asendorpf & van Aken, 2003; Cheng & Furnham, 2003; Ignatius & Kokkonen, 2005; Pullmann & Allik, 2000; Robins, Tracy, Trzesniewski, Potter, & Gosling, 2001; Worrell & Cross, 2004). Similarly, cognitive ability is related to WMS (Toomela, 2003c), coping style (Jones, Rapport, Hanks, Lichtenberg, & Telmet, 2003), aggression (Huesmann et al., 1987; Schonfeld, Shaffer, O'Connor, & Portnoi, 1988), drinking and drug abuse behavior as well as attitudes towards these behaviors (McCusker, Clare, Cullen, & Reep, 1993), and self-esteem (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005). Following these findings it was hypothesised that personality dimensions and cognitive ability have impact on participant's level of education, collectivism, coping styles, aggression, attitudes towards alcohol and narcotics, and self-esteem. In addition, it was hypothesised that personality dimensions are to some degree correlated one with another (cf. Costa & McCrae, 1992) as well as with cognitive ability and WMS (Toomela, 2003c).

Third, a person's level of education has been found to be related to WMS (Cole, 1996; Luria, 1974; Toomela, 2003c), collectivism (Telhaug & Medias, 2004), coping style (Tomberg et al., 2001), aggression (Koch & Probst, 1977), drinking and drug abuse behavior as well as attitudes towards these behaviors (Lillehoj, Trudeau, & Spoth, 2005; Rodgers et al., 2000), and self-esteem (Donnellan et al., 2005; Hair & Graziano, 2003). Correspondingly, participants' level of education was set to have impact on WMS, collectivism, aggression, attitudes towards alcohol and narcotics, and self-esteem.

Fourth, on the basis of theoretical considerations (cf. Toomela, 2003a, 2003b; Vygotsky & Luria, 1994) WMS was set to have impact on collectivism, coping style, aggression, attitudes towards alcohol and narcotics, and self-esteem.

Fifth, drinking and drug abuse behavior as well as attitudes towards these behaviors are related to collectivism (Eckersley, 2005; Gire, 2002), coping style (Courbasson, Endler, & Kocovski, 2002), and aggression (Jung, 2001; White & Hansell, 1993; White, Loeber, Stouthamer-Loeber, & Farrington, 1999; Zuckerman & Kuhlman, 2000). All mentioned studies also are in agreement with the idea that attitudes are affected by collectivism, aggression, and coping style. Thus, collectivism, coping styles, and aggression were allowed to have impact on attitudes towards alcohol and narcotics. In addition, different facets of collectivism (Realo et al., 1997), coping styles (Kallasmaa & Pulver, 2000), and aggression (Buss & Perry, 1992) were allowed to correlate one with another.

Sixth, there are some suggestions in the literature that aggression may also depend on coping styles (cf. Linden et al., 2003). Corresponding paths from coping styles to facets of aggression were introduced into the model for explorative purposes.

Finally, marker of the self-concept, the self-esteem, is related to collectivism (Oyserman, Coon, & Kemmelmeier, 2002), coping styles (Jones et al., 2003), aggression (Tremblay & Ewart, 2005), and attitudes towards alcohol and narcotics (Nakashima & Wong, 2000). Paths from collectivism, coping styles, aggression, and attitudes towards alcohol and narcotics to self-esteem were also introduced into the model.

## Method

### *Participants*

A sample ( $N = 1532$ ) of 18-23 years old healthy Estonian men participated in the study. Thirty-seven participants were excluded from the final sample because they failed to complete all questionnaire items. The final sample comprised 1495 participants with a mean



age of 20.03 years ( $SD = 1.17$ ), range 18 – 23 years. All participants were native Estonians, both by nationality and ethnicity, and all test materials were administered in the Estonian language. All kinds of family backgrounds of participants (in terms of socio-economic status and level of parents' education) were represented in the sample. Also, participants from all regions of Estonia were represented in the sample. There were 475 participants with primary education (9 years or less), 401 participants with professional education, 610 participants with secondary education (12 years), and 9 participants with a university degree (BSc or BA in all cases).

### *Test Materials*

*Personality Inventory.* Personality was assessed with the Estonian version of the revised NEO Personality Inventory, NEO-PI-R (Costa & McCrae, 1992). Estonian NEO-PI-R (Kallasmaa, Allik, Realo, & McCrae, 2000) was developed on the basis of Estonian NEO-PI (Pulver, Allik, Pulkkinen, & Hämäläinen, 1995). For this study a short version of NEO-PI-R was created. Six items with highest loadings on the factor for each of the personality dimension were chosen for the short version. Thus, the short version comprised 30 items. The following personality dimensions are measured by this test: Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness. The internal consistency coefficients for short version domain scales were 0.73, 0.80, 0.73, 0.68, and 0.80 for N, E, O, A, and C, respectively.

*Cognitive Ability.* Cognitive ability was assessed by the original Scale of Cognitive Abilities (Pulver, 1999). The Scale of Cognitive Abilities has three parts: verbal abilities (meanings of words and sentences, synonyms and antonyms, meaning of metaphors and proverbs, analysis of grammatical functions), logical-mathematical reasoning (number series problems, mental arithmetic), and visual-spatial abilities (picture completion, spatial reasoning, mental rotation). Each of the three parts comprised nine items, all in multiple-

choice format. Cognitive ability level was characterized by the sum of correct answers.

Cronbach alpha (based on tetrachoric correlations) for the whole scale = .92.

*Word Meaning Structure.* Dominant type of the structure of word meaning was assessed with an 18-item short version of the originally 26-item test (Toomela, 2003c). The test was constructed as suggested by Luria (1979). Three complementary ways for measuring word meaning structure were used. First part of the test comprised definitions of six concepts. Half of the concepts were concrete (car, hospital), half of the concepts were abstract (republic, revolution). Second part comprised six pairs of words; the task was to describe the most important similarity of the concepts. Word-pairs varied in the transparency of similarity – words referring to items from the same category in one extreme (dog-cat) and words referring to objects in complementary relationships in the other extreme (head-hat). The third part comprised 6 triplets of words. The task was to indicate which two words out of three “go together”, and to define explicitly why the chosen two words go together.

All 18 answers were coded into two categories, Everyday Concepts (coded as 0) and Scientific Concepts (or, “hierarchical” concepts, coded as 1). The criteria for coding were those proposed by Luria (1979). An answer was coded Everyday Concept when definition, description of similarity or definition of commonality described (a) sensory attributes of objects (e.g., “‘car’ and ‘bicycle’ go together because both have round wheels,” “‘door’ and ‘window’ go together because both are rectangular”), (b) observations of external everyday activities (e.g., “‘school’ is where children go for learning”), (c) observations of everyday situations, connections of objects in everyday situations (e.g., “‘potato’ and ‘carrot’ go together because both grow in the field”), (d) function of the object was described (e.g., “‘car’ is for driving from one place to another”), (e) sharing of parts was described (e.g., “‘cat’ and ‘dog’ are similar because both have sharp teeth”), (f) no answer was given. Why “no answer” was coded as Everyday Concept needs an explanation. Theoretically, especially

with definition of abstract concepts, finding similarities of objects that usually are in a complementary relationship, or defining reasons why words in different cases go together, there are no obvious and transparent answers to the questions at the Everyday Concept level at all. Similarity of 'a horse' and 'a rider' is not coded in everyday concepts, a hierarchical "both are living beings/animals" is required. If a person whose dominant structure of word meaning is of Everyday Concept type is required to answer such questions nothing comes to mind. It is important to note here that all participants answered at least to two items in each of the three parts. So, absence of the answer cannot be attributed to the lack of motivation only. An answer was coded as Scientific (or hierarchical) Concept type when (a) relationship between words was defined hierarchically (e.g., "'knife' and 'bread' are similar because they are both physical objects", "'drives' and 'opens' go together because both are verbs"), (b) a word was related to the hierarchically higher level concept (e.g., "'hospital' is a medical institution," "'revolution' is a kind of change that is characterized by sudden reorganization of a system").

The tests were coded by two assistants (about half of the tests, each). In addition, protocols of 50 randomly selected participants were simultaneously coded by both assistants. Interrater agreement was adjusted for chance, Cohen's  $\kappa = .91$ . With all other protocols doubtful cases were coded after discussion between assistants. Cronbach alpha (based on tetrachoric correlations) for the whole scale = .84. Participant's dominant structure of word meaning was characterized with a sum of all item scores (maximum 18). The higher the sum, the more hierarchical Scientific Concept type of answers was given by a participant.

*The Estonian Collectivism Scale (ESTCOL)* (Realo et al., 1997) was used to assess the level of collectivism.. The original ESTCOL Scale consists of 24 items that measure three subtypes of collectivism related to family (*Familism*), peers (*Companionship*), and society (*Patriotism*). High level of *Familism* suggests dedication of one's life to family and putting

its interests higher than one's personal aspirations. High level of *Companionship* is related to tight relations between an individual and his/her neighbors, friends, co-workers, and by the individual's focus on the needs of his/her ingroup. Finally, high level of *Patriotism* means dedication to serve one's nation by surrendering one's personal comforts to the latter. These three subtypes of Collectivism are hierarchically subordinated to one general, secondary factor of Collectivism (Realo et al., 1997). In this study a short version of the ESTCOL was used. The short version included five items for assessing Familism, five items for assessing Companionship, and four items for assessing Patriotism. The internal consistency coefficients for short version domain scales were 0.67, 0.61, and 0.79 for Familism, Companionship, and Patriotism subscales, respectively.

*Coping style.* Coping styles were assessed by the Estonian version (Kallasmaa & Pulver, 2000) of the Brief COPE scale (Carver, 1997). The scale measures three broad coping styles: Task oriented style, Social-Emotional style, and Avoidance oriented style. The short form of the scale comprised 16 items. Respondents were asked to indicate their agreement with the items on a 4-point Likert-type scale. The higher the score on the subscale the more a person relies on that particular coping style. The internal consistency coefficients for short version domain scales were 0.63, 0.75, and 0.63 for Task oriented, Social-Emotional, and Avoidance oriented styles, respectively.

*Aggression Questionnaire.* Aggression level was assessed with the Estonian version of the Aggression Questionnaire (Buss & Perry, 1992). Estonian version of the Aggression Questionnaire (Muug, 1997) comprises three subscales (Verbal Aggression, Physical Aggression, Anger) from the original four scales. For this study a short version of the Aggression Questionnaire was created. Four items with highest loadings on the factor for each of the three aggression domains were chosen for the short version. Thus, the short version comprised 12 items. Respondents were asked to indicate their agreement with the

items on a 6-point Likert-type scale. Aggression level was characterized by the sum of the item scores. The internal consistency coefficients for short version domain scales were 0.80, 0.65, and 0.73 for Physical Aggression, Verbal Aggression, and Anger, respectively.

*Attitudes towards alcohol and narcotics.* Attitudes towards alcohol and narcotics use were assessed by two questionnaires developed by (Pulver, 2000). The Estonian Scale of Tolerance for Alcohol and Narcotics Use assessed attitudes on the dimension liking-disliking utilization of alcohol and narcotics. Ten items of the scale are answered on a five point Likert type scale ranging from 0 (strongly disagree) to 4 (strongly agree). The ratings for the statements were summed. Higher scores represented higher levels of liking alcohol and narcotics. Cronbach alpha for the whole scale = .62.

The Estonian Reasons to Used Alcohol and Narcotics Scale assessed the reasons why informants use or would use alcohol or narcotics (e.g., relaxes, helps to create relationships, makes life interesting, etc.). Twelve items of the scale are answered on a five point Likert type scale ranging from 0 (strongly disagree) to 4 (strongly agree). The ratings for the statements were summed. Higher scores represented more and stronger reasons to use alcohol and narcotics. Cronbach alpha for the whole scale = .87.

*Self-esteem.* Self-esteem was assessed by the Estonian version (Pullmann & Allik, 2000) of the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The scale measures global self-esteem. Ten items of the scale are answered on a five point Likert type scale ranging from 0 (strongly disagree) to 4 (strongly agree). The ratings for the statements were summed, with negative statements reverse coded. Higher scores represented higher levels of self-esteem. Cronbach alpha for the whole scale = .83.

## Results

First, we were interested in relationships between the variables. Correlations between the variables are provided in Table 1. Inspection of the Table 1 reveals that the level of

education was correlated with WMS, collectivism (familism facet), coping style (all facets), aggression (physical aggression and anger), attitudes towards alcohol and narcotics, and self-esteem. However, participant's level of education was also correlated with personality and cognitive ability. All Characteristic Adaptations in the study were correlated with at least one dimension of personality. Cognitive ability was also correlated with the same facets of Characteristic Adaptations as the participant's level of education. These results suggest that relations between Characteristic Adaptations and the level of education may be spurious. In order to discover the nonspurious correlates of the level of education, it was necessary to test a complex model where a system of relationships is directly taken into account.

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 Insert Table 1 about here  
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In order to test the set of our hypotheses we conducted a path analysis. The model was defined as described in the Introduction (see Figure 1). The model was analysed and the maximum-likelihood estimates of the parameters of the model were generated with Mplus 1.0 (Muthen & Muthen, 1998). We used two fit indices, chi-square divided by degrees of freedom ( $\chi^2/df$ ) and root mean square error of approximation (RMSEA) to assess the model fit. The acceptable values of  $\chi^2/df$  range from 1 to 3 (Bollen, 1989). The cutoff value for RMSEA is 0.06 (Hu & Bentler, 1999).

The model fit was very good ( $\chi^2(18) = 37.27$ ;  $\chi^2/df = 2.07$ ; RMSEA = .027; 90% Confidence Interval for RMSEA = .014 - .039). Standardised parameter estimates of the model are contained in Table 2.

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 Insert Table 2 about here  
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Inspection of the Table 2 reveals several interesting findings. First, parents' level of education was related only to Basic Tendencies (personality dimensions and cognitive ability) and to the participant's level of education.

Second, cognitive ability was not related any more to the aggression, attitudes towards narcotics and alcohol, and self-esteem directly. Still, there were indirect relations of the cognitive ability to these constructs through the participant's level of education and WMS.

Third, it turned out that some relations between the participant's level of education and Characteristic Adaptations were not statistically significant any more after the effects of Basic Tendencies were taken into account. At the same time, the level of education was still related to noncognitive constructs in the model (collectivism, coping style, aggression, attitudes towards alcohol and narcotics, and self-esteem) but not to all facets of them. Participant's level of education was not significantly related any more to social-emotional and avoidance oriented coping style; relation to the reasons to use alcohol and narcotics, however, became statistically significant in the complex model.

Fourth, as hypothesised, the WMS also mediated the effects of Basic Tendencies and the level of education on Characteristic Adaptations. At least some facets of all constructs (collectivism, coping styles, aggression, attitudes towards alcohol and narcotics) were significantly related to WMS even when the effect of Basic Tendencies and the level of education was directly taken into account in the model.

### Discussion

The aims of formal education systems in Western societies are usually both cognitive and noncognitive. Outcomes of education, however, are usually assessed in terms of academic-cognitive (school grades, results of academic tests, etc.) and social-economic (career success, average salary, socio-economic status, etc.) characteristics. Less is known about individual noncognitive correlates of education. One reason why noncognitive

correlates of education are less assessed may be that, in schools, values are mostly learned through students' experience of the total environment, rather than through direct instruction. In such situation it is less clear what exactly should be assessed because the noncognitive aims of education are defined in very broad terms whereas cognitive-academic aims are specified in great details.

Nevertheless, there are many studies where noncognitive correlates of education have been reported (in many cases these reports do not discuss correlates of education but rather try to rule out the effect of education in order to study relations between different characteristics of mind). The same noncognitive characteristics that are correlated with the level of education, however, are also related to personality and cognitive ability. In addition, the level of education is also related to personality and cognitive ability. Thus, in order to reveal nonspurious correlates of education it is necessary to take into account the effect of mainly biologically determined characteristics of mind (personality dimensions and cognitive ability).

The aim of this study was to reveal noncognitive correlates of education. The study was based on the Five Factor Theory of personality (McCrae & Costa, 1996, 1999). According to FFT personality system is composed of biologically determined Basic Tendencies that together with External Influences (Culture) affect Characteristic Adaptations. Two modifications to FFT were introduced in our study. First, cognitive ability was added to personality dimensions in the list of Basic Tendencies. Second, following the ideas from cultural-historical psychology (Toomela, 1996, 2003a, 2003b), dominant type of word meaning structure was hypothesised to mediate the effect of education on Characteristic Adaptations. In addition, family background (father's and mother's level of education) was also included in the model.



Several findings of this study have implications for better understanding of the effects of education and individual differences in noncognitive characteristics of mind. There were many significant zero-order correlations between variables. Nevertheless, only the results of path analysis where a system of relationships between variables was modeled will be discussed because relations between variables changed in the model.

First, it was found that the level of mother and father's education was related only to Basic Tendencies (personality dimensions and cognitive ability) and to the participant's level of education. Parents' level of education had no direct impact on Characteristic Adaptations. Teachers very often attribute unacceptable behaviors and attitudes of pupils to family background, especially to social-cultural home environment. Our results suggest that family influences on children, at least in terms of the constructs assessed in this study, are constrained to Basic Tendencies and not to Characteristic Adaptations. The role of educational system in modifying Characteristic Adaptations may be more substantial and the role of social-cultural home environment less substantial than teachers often assume.

Next, all Characteristic Adaptations were related to at least one personality dimension. Thus, personality, indeed, has substantial role in individual differences in Characteristic Adaptations as the FFT suggests. The most important predictor of Characteristic Adaptations was Extraversion, which was related to all Characteristic Adaptations with the exception of familism facet of collectivism. The least important was the Conscientiousness dimension.

It is also noteworthy that the participants' level of education was related negatively to Neuroticism and positively to Openness to Experience. These results are in expected directions. Conscientiousness, however, as well as Extraversion and Agreeableness, were not related to the level of education. It has been found that all five personality dimensions are related to grade point average of adolescents (Lounsbury et al., 2003). As a rule, pupils with

lower grades drop out earlier from the formal system of education. Thus, the results of that study suggest that more personality dimensions should be related to the level of education than was found in our study. In our study, however, more complex relations between Basic Tendencies and education were modeled. In our study there were significant zero-order correlations between the level of education and Neuroticism, Openness, Extraversion, and Conscientiousness. The latter two relations became nonsignificant in the complex model. Thus, again, it turned out that zero-order correlations may be spurious. Our results suggest that higher level of education is supported by emotional stability and curiosity about both inner and outer worlds. Purposefulness, strong will, and determination (aspects of Conscientiousness), however, seem to be less important as also are sociability (Extraversion) and interpersonal altruistic tendencies (Agreeableness).

Third, the level of education was affected by cognitive ability. This result, apparently, is quite trivial. But together with data about relations between personality dimensions and the level of education this fact becomes more interesting. It can be suggested that school success is mainly related to curiosity (Openness) and cognitive ability; hard work often promoted by teachers (and supported by Conscientiousness dimension of personality) turns out to be less important.

Fourth, the level of education was related to Characteristic Adaptations even when the effect of Basic Tendencies was taken into account. It should be stressed that not all zero-order relations remained significant in the complex model. Nevertheless, the higher level of education was negatively related to familism facet of collectivism, physical aggression and anger facets of aggression, attitudes towards alcohol and narcotics and reasons to use alcohol and narcotics. The level of education was indirectly, mediated by WMS also negatively related to social-emotional coping style. The level of education was positively related to task

oriented coping style and self-esteem. In addition, the level of education was indirectly, mediated by task oriented coping style also positively related to verbal aggression.

Overall, these results are in agreement with other studies where zero-order relations between the level of education (or school success) and Characteristic Adaptations have been reported. Specifically, the level of task oriented coping style has been found to be higher in more educated persons (Tomberg et al., 2001). Task oriented coping approach to problematic situations usually tends to benefit individuals more than the use of other coping strategies (Courbasson et al., 2002; Endler & Parker, 1994; Wills & Hirky, 1996). Correspondingly, it turns out that persons with higher level of education tend to use more adaptive strategies when approaching problems.

Higher level of aggression is related to lower level of education (Koch & Probst, 1977; Kubicka et al., 2001; Lounsbury et al., 2003). In our study the higher level of education was related to lower levels of physical aggression and anger. There was not direct effect of education on verbal aggression. Indirectly, mediated by task oriented coping style, the level of education was positively related to verbal aggression. Thus, our results suggest that the level of education is related to decrease in socially less accepted physical aggression whereas some increase in verbal aggression may be related to higher level of education. Speculatively, these results suggest that it is not only the overall level of aggression that decreases with the increase in the level of education. The pattern of aggressive responses also changes. Physical aggression and anger are to some degree replaced by acts of verbal aggression.

Utilization of alcohol and narcotics was more accepted by persons with lower level of education. Also, persons with lower level of education reported more reasons why to use alcohol or narcotics. Other studies have found that low level of academic achievement may be a precursor to the problem behavior of substance initiation (Lillehoj et al., 2005). Thus,

again, higher level of education is related to more adaptive noncognitive psychological characteristics.

Self-esteem is usually positively related to the level of education or academic achievement (Donnellan et al., 2005). Theoretically, global self-esteem, assessed in this study, should be distinguished from the specific self-esteem. Specific self-esteem has a direct effect on behavior (or behavioral outcomes), whereas global self-esteem has a direct effect on psychological well-being (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). It can be conjectured that global self-esteem may be a consequence of education as the model tested in our study implicitly assumes rather than a variable affecting the level of education. In our study the level of education had a significant positive impact on the global self-esteem. In concordance with the other findings in our study, it turned out that higher level of education is related to positive and adaptive characteristics of mind.

Taken together, our results suggest that the higher level of education is related to adaptive and positive aspects of coping styles, aggression, attitudes towards narcotics and alcohol, and self-esteem. Thus, the positive noncognitive aims of National Curricula seem to be achieved to some degree by the educational system. There was one interesting exception, though. Curricula also emphasise care and consideration towards other people, both individual and collective responsibility, respect for others, compassion, to respect and be sensitive to the rights of individuals, families, and groups to hold values and attitudes which are different from their own. All these values can be understood as collectivistic. We found, however, that higher level of education was related to the lower level of one facet of collectivism, familism. Indirectly, mediated through WMS, the level of education was also negatively related to peer facet of collectivism. Even though citizen responsibilities are also aims of National Curricula of several countries, including Estonia, the level of education was not related to the society level collectivism, patriotism. This finding is to some degree

unexpected because direct instruction aimed to develop citizenship is usually part of the educational system. Here it seems that the formal aims of the National Curriculum are not achieved. This finding, however, may not be surprising considering that Western system of formal education seems increasingly to support decentralisation and individualisation (Telhaug & Medias, 2004). Thus, it is possible that positive aims of National Curricula may sometimes be in contradiction with the values implicitly written into curricula and also with the values actually promoted by school environment.

Last but not least, results of our study allow better to understand mechanisms by which the system of education may promote attitudes and values. In cultural-historical psychology it has been suggested that formal system of education is related to the development of word meaning structure (Cole, 1996; Luria, 1974; Toomela, 2003c). The development of word meaning structure, in turn, should be related to changes in all aspects of psychological functioning that rely on culturally conditioned semiotically mediated processes (Toomela, 2003a, 2003b; Vygotsky, 1996; Vygotsky & Luria, 1994). Our results are in agreement with these theoretical ideas. WMS was related to the level of several Characteristic Adaptations after the effect of Basic tendencies and the level of education was taken into account in the model. Thus, the way in which persons organize information is related to attitudes and values. This result is interesting because it suggests that for promoting attitudes and values in formal education system it is not only the content of the value or attitude that is important but also the abstract way in which this content is presented.

In the end, we would like to mention some possible further directions for the research. First, only male persons participated in our study. It might be possible that different pattern of relationships between studied variables characterises female persons. Second, results of our study suggest that complex studies are needed in order to understand noncognitive correlates of education. It is likely that in studies where only a few variables are assessed, spurious

correlations are found. Third, word meaning structure appears to be an important variable that should be included in the studies of education. Finally, results of our study concern correlates of the level of education. Longitudinal studies are needed in order to reveal which of the correlates are actually consequences of formal education.

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Table 1. *Correlations between variables (N = 1495)*

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22*
Father's Level of Education (1)	<b>.50</b>	<b>.13</b>	<b>-.12</b>	<b>.11</b>	.03	<b>.13</b>	-.00	<b>.24</b>	<b>.10</b>	-.05	-.03	.04	.06	-.04	-.08	-.08	.02	-.07	-.05	-.04	.07
Mother's Level of Education (2)	-	<b>.12</b>	-.09	.08	.09	.01	-.02	<b>.19</b>	<b>.10</b>	-.04	-.02	.06	.08	-.00	-.05	-.03	-.00	-.03	-.03	-.03	.04
Cognitive Ability (3)	-	-	<b>-.28</b>	.06	<b>.16</b>	.03	.01	<b>.44</b>	<b>.51</b>	<b>-.20</b>	<b>-.17</b>	.03	<b>.17</b>	<b>-.15</b>	<b>-.18</b>	<b>-.17</b>	.03	<b>-.15</b>	<b>-.15</b>	-.03	<b>.24</b>
Personality: Neuroticism (4)	-	-	-	<b>-.35</b>	-.07	<b>-.23</b>	.01	<b>-.31</b>	<b>-.22</b>	<b>.16</b>	<b>.13</b>	-.04	<b>-.22</b>	<b>.28</b>	<b>.47</b>	<b>.29</b>	-.05	<b>.43</b>	<b>.15</b>	<b>.15</b>	<b>-.56</b>
Personality: Extraversion (5)	-	-	-	-	.07	<b>.45</b>	<b>.16</b>	<b>.16</b>	.06	.03	.08	<b>.12</b>	<b>.32</b>	-.03	<b>-.27</b>	-.01	<b>.19</b>	-.09	-.02	-.00	<b>.43</b>
Personality: Openness (6)	-	-	-	-	-	.02	.09	<b>.13</b>	<b>.17</b>	-.09	-.03	.09	<b>.21</b>	.06	.02	-.10	.05	-.07	<b>-.10</b>	-.06	.09
Personality: Conscientiousness (7)	-	-	-	-	-	-	<b>.13</b>	<b>.12</b>	.02	.04	.08	<b>.11</b>	<b>.17</b>	-.06	<b>-.19</b>	-.07	.07	<b>-.12</b>	<b>-.12</b>	<b>-.12</b>	<b>.26</b>
Personality: Agreeableness (8)	-	-	-	-	-	-	-	.01	.02	<b>.19</b>	<b>.18</b>	<b>.18</b>	<b>.23</b>	-.02	.02	<b>-.24</b>	<b>-.10</b>	<b>-.20</b>	<b>-.11</b>	-.07	<b>.12</b>
Participant's Level of Education (9)	-	-	-	-	-	-	-	-	<b>.35</b>	<b>-.20</b>	-.09	.04	<b>.19</b>	<b>-.11</b>	<b>-.16</b>	<b>-.18</b>	.06	<b>-.19</b>	<b>-.17</b>	-.09	<b>.29</b>
Word Meaning Structure (10)	-	-	-	-	-	-	-	-	-	<b>-.20</b>	<b>-.14</b>	-.01	<b>.17</b>	-.07	<b>-.13</b>	<b>-.17</b>	.01	<b>-.12</b>	<b>-.14</b>	.03	<b>.20</b>
Collectivism: Familism (11)	-	-	-	-	-	-	-	-	-	-	<b>.34</b>	<b>.29</b>	.01	.03	.05	.05	-.02	.04	-.08	-.03	-.04
Collectivism: Peers (12)	-	-	-	-	-	-	-	-	-	-	-	<b>.27</b>	.02	.08	.08	.03	-.05	.01	.05	.04	-.08
Collectivism: Patriotism (13)	-	-	-	-	-	-	-	-	-	-	-	-	<b>.13</b>	-.04	.01	<b>-.10</b>	-.05	<b>-.11</b>	<b>-.21</b>	<b>-.11</b>	.04
Coping style: Task (14)	-	-	-	-	-	-	-	-	-	-	-	-	-	<b>.03</b>	<b>-.10</b>	<b>-.12</b>	<b>.15</b>	<b>-.14</b>	-.09	-.06	<b>.34</b>

Coping style: Emotional (15)	-	<b>.42</b>	<b>.29</b>	.09	<b>.31</b>	<b>.23</b>	<b>.25</b>	<b>-.17</b>
Coping style: Avoidance (16)	-	<b>.20</b>	-.02	<b>.29</b>	<b>.15</b>	<b>.14</b>	<b>-.43</b>	
Aggression: Physical (17)	-	<b>.37</b>	<b>.63</b>	<b>.24</b>	<b>.26</b>	<b>-.19</b>		
Aggression: Verbal (18)			-	<b>.34</b>	<b>.14</b>	<b>.11</b>	<b>.10</b>	
Aggression: Anger (19)				-	<b>.20</b>	<b>.24</b>	<b>-.29</b>	
Attitudes towards narcotics (20)					-	<b>.38</b>	<b>-.13</b>	
Reasons to use narcotics (21)						-	<b>-.07</b>	

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*Note:* Statistically significant correlations ( $p < .0001$ ) are in bold.

\* 22 = Self-esteem



Table 2. *Standardised parameter estimates of the effects of predictors on the dependent variables (N = 1495)*

Predictors	Dependent Variables																				
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22*	
Father's Level of Education (1)	<b>.09</b>	<b>-.11</b>	<b>.09</b>	-.01	<b>.17</b>	.01	<b>.14</b>	.00	-.01	-.02	-.00	-.03	-.02	-.00	-.05	.01	-.03	.00	.01	-.03	
Mother's Level of Education (2)	<b>.07</b>	-.03	.03	<b>.09</b>	<b>-.07</b>	-.02	<b>.06</b>	.02	.01	.02	.05	.04	.02	-.00	.02	-.04	.02	.01	-.02	-.03	
Cognitive Ability (3)							<b>.36</b>	<b>.45</b>	<b>-.07</b>	<b>-.11</b>	.03	.05	<b>-.09</b>	<b>-.07</b>	-.00	.02	.02	-.03	.03	.03	
Personality: Neuroticism (4)	<b>-.26<sup>a</sup></b>						<b>-.16</b>		<b>.11</b>	<b>.12</b>	-.00	<b>-.09</b>	<b>.29</b>	<b>.41</b>	<b>.21</b>	.04	<b>.37</b>	.02	.04	<b>-.32</b>	
Personality: Extraversion (5)	.04 <sup>a</sup>	<b>-.33<sup>a</sup></b>					.04		.05	<b>.08</b>	<b>.06</b>	<b>.22</b>	<b>.09</b>	<b>-.11</b>	<b>.16</b>	<b>.19</b>	<b>.13</b>	<b>.08</b>	<b>.09</b>	<b>.19</b>	
Personality: Openness (6)	<b>.15<sup>a</sup></b>	<b>-.07<sup>a</sup></b>	<b>.07<sup>a</sup></b>				<b>.05</b>		<b>-.06</b>	-.01	<b>.07</b>	<b>.15</b>	<b>.10</b>	<b>.07</b>	<b>-.06</b>	.02	-.04	<b>-.07</b>	<b>-.06</b>	.01	
Personality: Conscientiousness (7)	.02 <sup>a</sup>	<b>-.22<sup>a</sup></b>	<b>.44<sup>a</sup></b>	.02 <sup>a</sup>			.04		.04	.06	<b>.06</b>	.02	-.03	<b>-.05</b>	-.02	-.01	-.02	<b>-.09</b>	<b>-.10</b>	.02	
Personality: Agreeableness (8)	.01 <sup>a</sup>	.01 <sup>a</sup>	<b>.16<sup>a</sup></b>	<b>.09<sup>a</sup></b>	<b>.13<sup>a</sup></b>		-.00		<b>.18</b>	<b>.16</b>	<b>.15</b>	<b>.18</b>	-.05	.03	<b>-.25</b>	<b>-.16</b>	<b>-.21</b>	-.03	.01	<b>.06</b>	
Participant's Level of Education (9)									<b>.13</b>	<b>-.10</b>	-.00	.01	<b>.06</b>	-.01	.01	<b>-.06</b>	.02	<b>-.05</b>	<b>-.09</b>	<b>-.06</b>	<b>.09</b>
Word Meaning Structure (10)		<b>-.05<sup>a</sup></b>	.01 <sup>a</sup>	<b>.08<sup>a</sup></b>	-.01 <sup>a</sup>	.02 <sup>a</sup>			<b>-.10</b>	<b>-.06</b>	-.06	<b>.06</b>	.02	-.01	<b>-.06</b>	-.03	.01	<b>-.06</b>	<b>.10</b>	.02	
Collectivism: Familism (11)																			<b>-.11</b>	-.04	<b>.06</b>
Collectivism: Peers (12)										<b>.25<sup>a</sup></b>									<b>.10</b>	<b>.06</b>	<b>-.05</b>
Collectivism: Patriotism (13)										<b>.27<sup>a</sup></b>	<b>.24<sup>a</sup></b>								<b>-.17</b>	<b>-.08</b>	-.03



Figure Caption

Figure 1. *A representation of the system of relationships between Basic Tendencies, Education, Word Meaning Structure, Characteristic Adaptations and Self-Concept tested in this study.*

