

**THE DEVELOPMENT OF INTELLIGENCE
AND PERSONALITY TRAITS AMONG
ESTONIAN SCHOOLCHILDREN**

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following original publications which will be referred to in the text by their respective Roman numerals.

- I Lynn, R., Allik, J., **Pullmann, H.**, & Laidra, K. (2002). A study of intelligence in Estonia. *Psychological Reports*, 91, 1022–1026.
- II Lynn, R., **Pullmann, H.**, & Allik, J. (2003). A new estimate of the IQ in Estonia. *Perceptual and Motor Skills*, 97, 662–664.
- III **Pullmann, H.**, Allik, J., & Lynn, R. (2004). The growth of IQ among Estonian schoolchildren from 7 to 19. *Journal of Biosocial Science*, 36, 735–740.
- IV Lynn, R., Allik, J., **Pullmann, H.**, & Laidra, K. (2004). Sex differences on the Progressive Matrices among adolescents: Some data for Estonia. *Personality and Individual Differences*, 36, 1249–1255.
- V Allik, J., Laidra, K., Realo, A., & **Pullmann, H.** (2004). Personality development from 12 to 18 years of age: The mean levels and structure of traits. *European Journal of Personality*, 18, 445–462.
- VI **Pullmann, H.**, & Allik, J. (2000). General self-esteem: Its dimensionality, stability, and personality correlates in Estonian. *Personality and Individual Differences*, 28, 701–715.
- VII **Pullmann, H.**, & Allik, J. *The paradox of high academic achievement but low self-esteem*. Submitted for publication.

INTRODUCTION

The main purpose of this dissertation was to continue the research legacy of Juhan Tork (1889–1980) in the systematic psychological assessments of Estonian schoolchildren. The study of the developmental trends in the mean levels of general intelligence and personality dispositions in such a small country as Estonia has a special significance. The recent history of this country can be viewed as a “natural experiment” during which a considerable part of the population was forced to emigrate or was sent to Soviet labor camps, which many did not survive. It is legitimate to ask what impact it has all had on the nation’s intelligence level considering that the part of the population to leave the country was the most industrious and prosperous. This historical context of Estonia is, of course, only one reason for why the study of cross-sectional trends across the lifespan – particularly in its early stages – is of theoretical significance. On the basis of the timing and direction of changes in both intelligence and personality traits it is possible to make inferences about the impact of social and biological processes on individual development.

However, in order to draw reliable conclusions about social and biological factors affecting individual development, it is necessary to have high-quality data. Although there are many studies of intelligence or personality they usually cover only one of these traits in a limited range of age groups. One can even notice a division of labor between developmental or personality psychologists: some of them have concentrated on the study of children aged 7 to 11 and another group of researchers have studied adolescents aged 12 to 18 (for overview, Shiner & Caspi, 2003). This division of duties is partly motivated by practical reasons. Indeed, a 7-year old boy or girl may experience difficulties in understanding items of a personality questionnaire that was originally intended for a 16-year old teenager who has a more elaborated understanding of personal and social surroundings. With the intention of making qualified observations about the development of intelligence and personality dispositions across all school ages it is desirable or even necessary to cover the whole age range from elementary to upper secondary school levels. Another serious limitation is reliance on convenient samples. For instance, many studies are carried out in elite schools associated either with universities or special programs for intellectually gifted students because these participants are usually motivated and cooperative. One of the most frequent limitations of these studies is that they represent a specific, usually better educated and economically more prosperous stratum of society. How well these data are generalizable to the whole population is open to speculation.

1. Goals of the study

The main theme of this dissertation was to study the cross-sectional developmental trajectories in the mean levels of nonverbal intelligence and personality traits across childhood and adolescence. More specifically, the thesis concentrates on the following problems:

- (1) How do Estonian schoolchildren mature intellectually compared to children of the same age living in other countries?
- (2) How do the mean levels of personality traits and their structure develop during the period of adolescence?
- (3) How is general self-esteem related to personality dimensions and academic achievement and does self-regard has systematic age differences?

To answer these research questions, the current project was aimed to collect data from a fairly large sample of schoolchildren, which would be representative of the whole Estonian-speaking population within this age range. Unlike any other studies in the field, this one built a large cross-sectional and longitudinal database that covered the whole school age from 7 to 18 years. The participants were drawn not only from the capital, Tallinn, or cities like Tartu and Pärnu, but more systematically from all Estonian counties including schools located in small towns and rural areas.

Although this dissertation reports only the results of cross-sectional studies, the author is fully aware of their limitations. “The problem with cross-sectional studies, of course, is that they confound aging with time of birth, and historical cohort effects – living through the Great Depression, or coming of age in the Internet era – could account for age differences” (Costa & McCrae, 2002). For that reason, cross-sectional studies were supplemented by a longitudinal study of which three study waves with two-year intervals have been completed. Indeed, it is crucial to analyze not only the change of means across different cross-sectional samples but to explore every individual trajectory of changes in intelligence level or personality traits.

In particular, the current dissertation addresses the following issues:

- Development of non-verbal intelligence across childhood and adolescence (Studies **I**, **II** and **III**);
- Cross-cultural comparison of the reasoning ability growth trajectories (Study **III**);
- Gender differences in developmental trajectories of mental development (Study **IV**);
- Development of personality traits and structure in adolescence (Study **V**);
- Measurement and stability of general self-esteem (Study **VI**);
- Relationship between self-esteem and academic achievement (Study **VII**).

2. Psychological assessment of Estonian schoolchildren from 7 to 18 years

The objective for collecting the data was to obtain a reasonably representative sample of Estonian schoolchildren across the age range from elementary to upper secondary school levels involving both urban and rural populations. A sufficiently large database could have a significant theoretical value by making it possible to study the psychological development of Estonian children thoroughly and reliably and to compare Estonian data to the results from other countries. Moreover, the practical outcome of the project was that several measures were standardized to be used for assessing with the national norms by Estonian school psychologists and researchers.

2.1. Estonian educational system

The Estonian educational system is divided into three parts: primary education, secondary education and post-secondary education. Thus, for the representative and comprehensive conclusions regarding the psychological development of Estonian schoolchildren, all grades from the first to twelfth had to be included in the research.

Generally, children who attain 7 years of age by October 1 of the current year are obliged to stay at school either until obtaining basic education or until the age of 17. Thus, the elementary and basic school levels (Grades 1–9) are commonly obligatory for everybody. The Basic School Graduation Certificate, obtained at the end of basic education, provides a student with the right to continue their studies at the next secondary level, which is divided into general secondary education (Grades 10–12) and secondary vocational education. There were 240 and 68 schools providing general secondary and vocational education, respectively, in 2004. Enrolment by educational level in 1999–2004 is reported in Table 1.

Table 1. Enrolment by educational level and type of study in September of each year in Estonia (thousand).

Educational level	1999	2000	2001	2002	2003	2004
Basic education	184.7	180.5	174.3	166.8	158.4	148.8
Secondary education	37.5	38.0	39.4	39.9	40.7	42.1
Vocational education¹	31.1	30.9	29.8	28.1	28.2	29.9
Post-secondary education²	49.6	56.4	60.4	63.6	65.7	67.8
Total³	302.7	305.8	304.0	298.4	293.0	288.6

Source: Statistical Office of Estonia. 1 – Vocational education is being acquired on the basis of upper secondary education for approximately the third of those students; 2 – Figures include also students of higher vocational education; 3 – Several students studied simultaneously in a professional secondary education institution and in a vocational education institution.

As graphically demonstrated in Figure 1, studying at vocational education and training institutions is the second-best choice for Estonian graduates. According to the Ministry of Education and Research of Estonia, in the academic year of 2004/2005, on average, 1.24 admission applications were submitted per person admitted with respect to secondary vocational education curricula based on basic school education. However, in vocational education schools one can acquire secondary vocational education after graduating from basic school or upper secondary school as well as acquire professional higher education. Those who have obtained secondary vocational education will also have the opportunity to study general education subjects and prepare for certificate examinations if they want to continue their vocational studies in an institution of higher education.

Further, the learning environment is also a factor which needs to be considered to obtain a database as representative as possible. The learning environment is a very broad concept and, for instance, includes the geographical region of the number of students attending the school. Despite the smallness and cultural homogeneity of Estonia, there are considerable regional differences between rural areas and towns. According to the Statistical Office of Estonia, about 72–74 percent of all schoolchildren attended basic or secondary schools in urban areas during this study. Another remarkable difference in educational settings is the difference between ordinary-public and elite-private schools as private schools can select more capable students from a large number of applicants. Although the number of private schools is increasing year-by-year, only about 2 percent of Estonian-speaking students attend private schools. Thus, an immoderate proportion of superior urban schools to be included in the sample may cause the results of the study of the intellectual development of Estonian schoolchildren to be biased.

Therefore, to answer the questions concerning the development of mental abilities and personality dispositions, an extensive study¹ was carried out in 2001–2005. In total, more than 8,700 Estonian-speaking students attending either at basic, secondary (day or evening form) level or vocational secondary schools was tested. To obtain a geographically heterogeneous sample for the school age population in the country, the data were drawn from the 15 Estonian counties including schools located in small towns and rural areas.

¹ This research was supported by the Estonian Science Foundation grants No 4519 and 5677 and a grant from the Ministry of Education and Science (0182585).

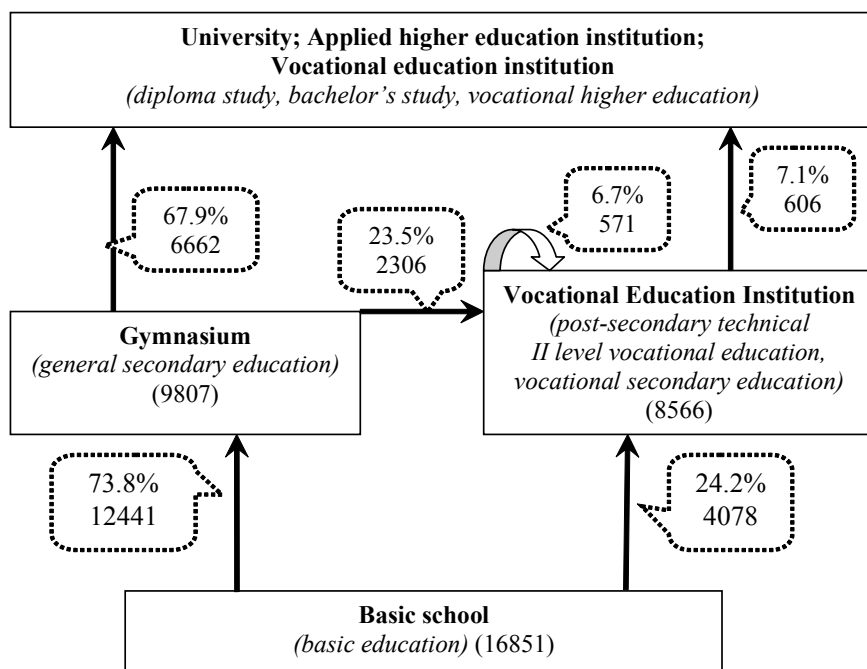


Figure 1. Further studies of the graduates from diurnal Estonian basic school and gymnasium in 2000.

Source: the Ministry of Education, Information and Statistical division (reproduced from Annus et al., 2001, p. 41).

2.2. Samples

The data collection was subdivided into five separate projects according to the year of testing. In this dissertation, only the data collected in Projects 1 and 2 is used (Studies **I**, **II**, **III**, **IV**, **V** and **VII**). The number of participants and other descriptive statistics across the projects are reported in Table 2.

2.2.1. Project 1

The first sample consisted of 2,751 adolescents (1,479 girls and 1,272 boys) attending grades 6, 8, 10 and 12. The mean ages of the students for the grades were 12.4 ($n=768$), 14.4 ($n=746$), 16.1 ($n=682$) and 17.8 ($n=555$) years, respectively. The sample was drawn from 27 Estonian-speaking public secondary schools and gymnasiums in 2001. Thus, approximately 11% of the relevant schools was participated in this study, as there were 236 upper secondary

schools in Estonia in this year. The data of this sample is used in the Studies **I**, **III**, **IV**, **V** and **VII**.

2.2.2. Project 2

The sample of 1,857 schoolchildren (892 girls and 965 boys) at elementary level (Grades 1, 2, 3 and 4) was tested in 2002. The mean ages of the children for the grades were 7.4 (n=414), 8.3 (n=483), 9.4 (n=445) and 10.5 (n=515) years, respectively. The sample was drawn from 17 schools from all over Estonia. Studies **II**, **III**, **V** and **VII** are using the data of this sample.

2.2.3. Project 3

In 2003, about the third of students (n=911) attending in Project 1 were retested with an interval of 2 years (the percentage of retested students was 61.9 when 12th grades from Project 1 were excluded). The mean ages of the longitudinally measured participants across the grades 8th, 10th and 12th were 14.5 (n=397), 16.4 (n=216) and 18.1 (n=298) years, respectively. In addition to the retested students, 773 children (342 girls and 431 boys) were tested with the mean age of 14.6±2.07 years, ranging from 11 to 20. In total, the whole sample consisted of 1,684 adolescents (951 girls and 733 boys) attending Grades 6, 8, 10 and 12. The mean ages of the students across the grades were 12.6 (n=359), 14.5 (n=489), 16.4 (n=484) and 18.2 (n=348) years, respectively. In this project, testings were carried out in a subset of schools (n=17) of Project 1.

2.2.4. Project 4

The fourth sample was drawn from three vocational secondary schools (n=390, 91 females and 299 males) and four evening secondary school (n=480, 274 females and 206 males) in different regions of Estonia in 2004. Thus, about 10% of the students attending evening schools participated in this project. The mean ages were 17.6±1.34 (ranging from 15 to 25 years) and 21.1±3.89 (ranging from 15 to 36 years) for the students of vocational and evening secondary schools, respectively. Data from students attending vocational and evening secondary institutions is also needed in order to verify a possible artifact of the sample's censorship and other sampling errors in case of data collected only from general secondary schools.

2.2.5. Project 5

The test-package was administrated to 1,595 adolescents (926 girls and 667 boys) attending grades 6, 8, 10 and 12 in 2005. The mean ages of the students for the grades were 12.5 (n=400), 14.6 (n=391), 16.4 (n=402) and 18.3 (n=402) years, respectively. The participants were divided as follows: (a) 402 students attended Projects 1 and 3 and, thus, were tested for the third time with intervals of two years; (b) 500 students participated in Project 3 and were retested the second time after two years; and (c) 693 students were tested for the first time. The 17 participating schools overlapped completely with those in Project 3.

Table 2. Overview of projects and participants in 2001–2005.

	Year	N	Females (%)	Males (%)	Mean age (yrs)	No of Schools	Cities/ Rural %
Project 1	2001	2,751	53	47	14.9±2.05	27 ^b	58 / 42
Project 2	2002	1,857	48	52	9.0±1.28	17 ^a	56 / 44
Project 3²	2003	1,684	56	44	15.4±2.02	17 ^b	66 / 34
Project 4	2004	870	42	58	19.0±3.26	7 ^c	71 / 29 ³
Project 5⁴	2005	1,595	58	42	15.5±2.26	17 ^b	66 / 34
Total	5 years	8,757	53	47	14.2±3.64	51	56 / 44

Note. N = Number of participants (due to uncompleted measures, missing answers, unknown variables, few cases in some age group or differences in age format (self-reported vs calculated based on the birth date), the number of participants may vary remarkably across the studies), ^a = elementary schools, ^b = basic and secondary schools, ^c = vocational and evening schools.

The data for the samples 1, 2, 3, and 5 was collected during the second half of the school year (from February to April). Written consent was obtained from participants' parents and students who did not want to participate were free to decline to do so. The measures were administered collectively in classrooms during school hours.

² The proportion of the retested students was 54% in this project.

³ Generally, students attending vocational and evening secondary schools live and have finished their studies at the basic level somewhere else in Estonia; thus, the current division based on the location of the schools could not be considered as reliable.

⁴ The proportion of the retested students was 57% in this project.

2.3. Measures

The test-package used in the projects consisted of measures to assess students' general non-verbal intelligence, personality traits, and self-esteem. More specifically, the following measures were included:

2.3.1. Nonverbal intelligence

Raven's Standard Progressive Matrices (*SPM*; Raven, 1981) test was used to measure students' intellectual abilities in the all projects 1–5 (reported in Studies I, II, III and IV). There is a widely accepted agreement that the *SPM* is one of the best scales to measure the non-verbal component of general intelligence. For instance, Jensen (1998, p. 541) as one of the leading experts in this field has written: "The total variance of Raven scores in fact comprises virtually nothing besides *g* and random measurement error". Similarly, the elaborators of the *SPM* claim that "The Progressive Matrices has been described as one of the purest and best measures of *g* or general intellectual functioning" (Raven, Raven, & Court, 2000, p. 34). It is also described as a measure of "the ability to identify relationships," "analogical thinking," and the ability to "think clearly". Moreover, the *SPM* is relatively independent of specific learning acquired in a particular cultural or educational context (Jensen, 1998).

The test is made up of a series of diagrams or designs with a part missing and those taking the test are expected to select the correct part to complete the designs from a number of options printed beneath (Raven, 2000). The 60 puzzles are divided into five sets (A, B, C, D, and E) of 12 items each and the same version can be used for a wide age range because of increasing difficulty level. In each set, the first problem is as nearly self-evident as possible. The problems which follow are build on the same reasoning as those that have gone before. Thus, the tasks provide opportunities to grasp the method of thought required to solve the problems, which become progressively more difficult. To ensure sustained interest and freedom from fatigue, each problem is boldly presented, accurately drawn, and, as far as possible, pleasing to look at. The test was administered without time limits, but in practice all children completed the test within 40 minutes. In addition, the exact completing time of the *SPM* was obtained in Projects 3–5.

2.3.2. Personality traits

The Estonian NEO Five-Factor Inventory (*NEO-FFI*; Allik, Laidra, Realo, & Pullmann, 2004) was used to measure personality dispositions in Projects 1, 3, and 5. This self-report questionnaire consists of 60 items to measure the five major personality domains: Neuroticism (N), Extraversion (E), Openness to

Experience (O), Agreeableness (A), and Conscientiousness (C). Each personality dimension was measured by 12 items on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Although the Estonian version is very similar to the original *NEO-FFI* (Costa & McCrae, 1992), the content of the items is not completely identical. The main psychometric properties of the *NEO-FFI* among Estonian schoolchildren are fully described in Study V.

For the elementary school students (Project 2), a more readable measure of personality dispositions was needed. Therefore, the 40-item Estonian Big Five Questionnaire for Children (*EBFQ-C*) was constructed based on the inventory developed by Barbanelli and his colleagues (2003). The main psychometric properties of the scale are fully described elsewhere (Laidra, Pullmann, & Allik, submitted for publication). For the first and second graders, the items of the questionnaire were read aloud. Children provided their self-reports on a 3-point rating scale (*1 = disagree, 2 = sometimes, 3 = agree*) in the short version of the personality inventory.

2.3.3. Global self-esteem

Overall attitude toward the self was measured by the Estonian version of the Rosenberg Self-Esteem Scale (*RSES*; Pullmann & Allik, 2000, Study VI) in Projects 1, 3, and 5. Participants indicated their extent of agreement or disagreement with 10 statements such as “*On the whole, I am satisfied with myself*” and “*I feel I do not have much to be proud of*” on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). For the sample of junior schoolchildren (Project 2), a modified and more readable version of the *RSES* was constructed in order to make the instrument more appropriate for the respondents of younger age. The original items of the *RSES* were restated using shorter and simpler analogues (e.g. the item “*I feel I’m not a person of worth, at least on an equal plane with others*” was replaced with “*I’m as useful as others*”). For the first and second graders, the items were read aloud. Additionally, the 5-point rating scale was replaced with a shorter version (*1 = disagree, 2 = sometimes, 3 = agree*). Both versions of the *RSES* are used in Study VII.

2.3.4. Academic self-esteem

Perception of self-competence in the academic domain was measured on the 8-item scale (*AcSES*) developed to assess students' academic self-esteem. Typical items in this measure include “*I am one of the best students of my class*” and “*I do well in most school subjects*”. Agreement with each item was rated on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Similarly to general self-esteem measure, a modified and more readable version of the *AcSES* using the 3-point rating scale was constructed for the children’s sample

(e.g. the item “*I feel confident of my academic abilities*” was replaced with “*I’m a clever pupil*”). For the first and second graders, the items were read aloud. The psychometric properties of both versions are reported in Study VII.

2.3.5. Self-estimated intelligence

Participants were asked to rate their intellectual capability compared to their classmates and average persons of their age in Projects 1, 3, 4, and 5. Subjects were provided with response categories ranging from 1 (*others are intellectually more able*) to 10 (*I am intellectually more able than others*).

2.3.6. Academic achievement

School success was measured using Grade Point Average (*GPA*), which was computed on the basis of the mark grades of principal subjects (e.g. Estonian, Literature, two foreign languages, Mathematics, Chemistry, Physics, Geography, Biology, History etc.) obtained during the last semester or two half terms. In primary and secondary schools, a uniform five point-scale grading system is used (5=excellent, 4=good, 3=satisfactory, 2=poor, 1=unsatisfactory). Grades were based on the school records. Unfortunately, not all schools agreed to provide information on their students’ academic achievement; therefore, the *GPA* could not be computed for all the participants. The mean level of the *GPA* regularly decreased through all the grades (for details, Study VII, Table 1).

3. Development of intelligence

Juhan Tork (1939) was the first researcher who systematically measured mental abilities among a large sample of Estonian schoolchildren and standardized intelligence tests, which were suitable for use from the 3rd to the 7th years of study.⁵ Since then, several important changes in Estonia have occurred both among the population of schoolchildren and in the educational system in general. Accordingly, it seemed to be an anachronism that there was no widely accepted standardized and validated instrument to be used for assessing the mental development of Estonian students nowadays and thus, to compare their mental maturity with data reported from other countries. Therefore, this section of the dissertation addresses the following issues:

- The development of Estonian standards for the Standard Progressive Matrices (*SPM*) as one of the most popular and highly valued culture-free assessment tools to measure non-verbal general intelligence (Studies **I**, **II** and **III**): How do Estonian schoolchildren mature intellectually from elementary to upper secondary school levels?
- Comparison of the intelligence development of Estonian schoolchildren with relevant data reported from other countries (Study **III**): Do Estonian schoolchildren have a similar level and trajectory of intellectual maturation as compared to the same-aged children from other countries, particularly in Great Britain and Iceland?
- Gender differences in developmental trajectories of mental maturity (Study **IV**): Do boys have a more advanced reasoning ability or are girls smarter than boys?

3.1. Developmental trajectory of general mental abilities

One of the goals of this study was to establish the representative age-norms of general mental abilities of Estonian schoolchildren from elementary to upper secondary school levels measured by the *SPM*. The standardization data of the *SPM* was needed for several reasons. First, as the practical outcome of the project, the national norms of the *SPM* will be applied by Estonian school

⁵ Juhan Tork (1889–1980) and his monumental study “*The Intelligence of Estonian Children*” is virtually unknown to the international research community. The main reason of this obscurity is that his doctoral dissertation published in the University of Tartu proceedings (Tork, 1939) was written in Estonian although supplemented with an extensive summary in English (11 pages). The fact that the whole print of this dissertation was destroyed by the new Communist rulers and its author was dismissed from the University of Tartu did not help to obtain international acclaim. He was forced to leave his home country in 1944 and afterwards never returned to his studies of intelligence.

psychologists in educational settings for assessing the students' level of abstract reasoning. As any of the intelligence tests have been properly standardized during the last decades, the norms of psychometric measures currently available in Estonia are definitely outdated. This was one motivating factor for the current project, which involves gathering local norms for school-age children in Estonia. Second, the collected data have a significant theoretical value because the national norms allow the intelligence development of Estonian children to be compared with data reported from other countries.

In Study **I**, the norms for the *SPM* for Estonian children of older school age, 12–18 years, are reported. The results indicated that the mean level of standardized IQ scores of the Estonian sample was approximately 5 points higher than British IQ norms reported in 1979. Adjustment for the estimated secular increase of intelligence in Britain reduced the mean IQ of the Estonian sample to 100.2 in relation to a British mean of 100. Study **II** reports the national mean levels of general intelligence among 7 to 11-year olds. The results revealed that the mean IQ score was estimated at 98 in relation to a British IQ of 100 after adjusting for the estimated secular increase. Altogether, combining Studies **I** and **II**, the results indicated that the mean level of intelligence of Estonian students is 99 in relation to a British mean of 100, provided that secular trends in Great Britain have preserved their previous pace.

This result confirms the general trend for European populations to have average IQ-s in the range of 90 to 105 (Lynn, 2001). The average IQ calculated for Estonian children is almost exactly in the middle of the range and, moreover, taking into account sampling and measurement errors, the average IQ in Estonia can be regarded as the same as that in Britain. This conclusion is of particular interest because the low living standards and a loss of a considerable proportion of the population decades ago had relatively little adverse impact on the non-verbal reasoning ability of Estonian schoolchildren. Further, Study **III** summarizes the results of Projects 1 and 2 with some additional data to give a complete overview of the cross-sectional intellectual development from 7 to 19 measured by the *SPM* (Pullmann, Allik, & Lynn, 2004, Table 1, p. 737). The scores of the Estonian students increased regularly with increasing age as expected. On average, the mean gradual increase in the raw scores of the *SPM* was more than 2 points per year, starting from 25.84 to 53.17 among 7 and 19-year olds, respectively. In the upper grades, the ceiling effect was generally apparent; however, the *SPM* demonstrated good discrimination among younger children.

An additional aim was to compare Estonian national norms of the *SPM* with those reported from other countries in order to identify unique features of intelligence development, if any, characteristic to Estonia, or a common pattern. The results of Study **III** confirmed that the level of mental abilities of Estonian schoolchildren does not differ significantly from children of the same age living in Great Britain (Raven, 1981) and Iceland (Pind, Gunnarsdóttir, & Jóhannesson,

2003), although there were some systematic differences in the growth trajectories of intellectual maturation. More specifically, the junior schoolchildren in Estonia initially lag behind in their intellectual development but catch up with their British and Icelandic counterparts when they have reached adolescence. As Lynn & Vanhanen (2002) reported, the mean intellectual level of a particular country is strongly related ($r = .757$) to the GDP, and thus, intellectual capital could be regarded as an important determinant of its economic development. At the moment, the question of whether this difference in the growth pattern of intellectual maturation may be due to schooling, biological or socio-economic factors still remains unknown. However, systematic differences in the growth pattern of nonverbal reasoning ability suggest that the development of intellectual capacities proceeds at different rates and the maturation process can take longer in some populations than in others.

3.2. Gender differences in the development of general intelligence

Study IV presents further data relating to the ongoing debate over gender differences in general mental abilities. Generally, there are two rival hypotheses about whether sex differences on intelligence tests exist. For many decades the consensus view has been among several leading experts that there are no sex differences, or at any rate only a negligible difference, in general intelligence (Court, 1983; Mackintosh, 1996; Jensen, 1998). However, this position was challenged by Lynn (1994, 1998, 1999) with the ‘the developmental theory of sex differences’ asserting that as of 15 years of age males have an advantage on reasoning tests compared to females. It is argued that this advantage is caused by larger male brain, which from the age of 15 years onwards is about 10% larger than the average female brain. As girls mature faster than boys, particularly during the growth spurt period between the ages of approximately 9–12 years, this gives them a slight advantage in their abstract reasoning ability between these ages, but this is replaced by an advantage for boys which emerges in the fifteenth year and persists into adulthood.

Moreover, the main interest of this debate is the *SPM*, which is widely regarded as one of the best measures to assess non-verbal reasoning ability and the essence of ‘fluid intelligence’. Thus, the issue of sex differences in the *SPM* becomes essential to the more general issue of whether there is a sex difference in ‘general intelligence’ and further evidence was needed to differentiate between these two rival theories.

Study IV was initiated to test whether there are sex differences in the developmental trajectories of general intelligence measured by the *SPM* among 12–18-year olds in Estonia. The results of Study IV provided several points of interest. Generally, the results confirmed Lynn’s theory demonstrating a diffe-

rence in the growth pattern of intellectual maturation regarding Estonian boys and girls. More specifically, in early adolescence girls outperform boys in their abstract reasoning ability but males have an advantage from age 15 onwards. Although differences in intelligence are rather small, they are still systematic and persistent.

Thus, there is no single simple answer to the question of whether girls are smarter than boys, but rather we could ask at what age range girls perform better in general ability tests. The conclusion for further research is that in order to explore sex differences in childhood or adolescence, similarly to the current study, a large cross-sectional sample with a wide age span is required to observe developmental changes in intelligence growth.

4. Development of personality traits

As compared to adults, knowledge concerning personality traits during the period of adolescence is much more limited. This lack of knowledge is caused by many factors including the incommensurability of measuring instruments. Researchers have been eager to develop specialized personality scales for children or adolescents while not all items used in the standard personality questionnaires may be equally comprehensible for them. In the result, data gathered by instruments that are used to study children's dispositions are not directly comparable to adult findings from adult instruments (cf. McCrae, Costa, Terracciano, Parker, Mills, De Fruyt, & Mervielde, 2002). However, a recent study has shown that even 12-year old children have enough abilities to understand and respond properly to items from adult personality questionnaires (De Fruyt, Mervielde, Hoekstra, & Rolland, 2000; Markey, Markey, Tinsley, & Ericson, 2002; McCrae et al., 2002; Parker & Stumpf, 1998). For example, De Fruyt and his colleagues (2000), who used the Dutch version of the Revised NEO Personality Inventory (*NEO-PI-R*) on a sample of Flemish schoolchildren aged 12 to 18, showed that adolescents experienced relatively few difficulties with understanding items from the adult personality test and that even the youngest group of participants demonstrated a satisfactory congruence to the adult normative structure (De Fruyt et al., 2000).

However, there was no evidence to what point the personality structure comparable to adults eventually forms and Study V was aimed at answering this intriguing question. Therefore, the mean levels of personality traits and their structure development during adolescence were investigated in this study.

Previous cross-sectional and longitudinal studies have concluded that most personality changes occur before the age of 30, with only modest changes thereafter (Costa & McCrae, 1994, 2002). Compared with the dramatic rise of intellectual capabilities occurring between 12 and 18 years of age, the development of personality traits seems to be practically frozen resembling the respective scores of adults (Study V). Only a small fraction of the change in the mean levels of personality traits was explained by age—only in the case of Agreeableness and Conscientiousness did it exceed the 1% level.

When is a personality structure fully developed? The results of Study V demonstrated that although the five-factor structure of personality measured by the *NEO-FFI* was recognizable in 12-year old children, it demonstrated only an approximate congruence with the adult structure. This suggests that not all children of that age have developed abilities required for observing one's own personality dispositions and for giving reliable self-reports on the basis of these observations as, for instance, personality structures of intellectually gifted 6th graders were comparable to the adult structures. The self-reported personality trait structure matures and becomes sufficiently differentiated around age 14–15

and grows to be practically indistinguishable from adult personality by the age of 16.

In general, the results of Study V seem to contribute to a surprising conclusion that there is little personality development in adolescence (McCrae, Martin, & Costa, 2005). The personality trait structures of 14-year olds are very similar those of adults one and become practically indistinguishable from adult personality structures by the age of 16.

5. Measurement of self-esteem

Self-esteem is one of the most frequently measured constructs in social and personality research (Blaschovich & Tomaka, 1991). As first stressed by James (1890), self-esteem is conceptually distinct from self-consciousness considered as the “average tone of self-feeling that each of us carries about with him, and which independent of the objective reasons we may have for satisfaction or discontent” (p. 306). Traditionally, self-esteem is defined as the evaluative aspect of a broader representation of the self, referring to global evaluations of one’s own characteristics and attributes (e.g., Wylie, 1974; Rosenberg, 1979).

5.1. Estonian version of the Rosenberg Self-Esteem Scale

The main goal of Study VI was to adapt the Rosenberg Self-Esteem Scale (*RSES*; Rosenberg, 1965) to Estonian. The Rosenberg scale has been used in a huge number of studies with widely varying populations and has been the focus of numerous psychometric evaluations. Similarly to several other personality measures, the *RSES* was previously established mainly in English-speaking North-American populations. A potential theoretical value of the Estonian standardization would be a demonstration of the generalizability of this popular measure across different languages and cultures which is still an open question.

The results of Study VI demonstrated that the Estonian version of the scale (*ERSES*) was similar to the original construct measuring a person's overall evaluation of his or her worthiness as a human being. The general self-esteem of Estonians appeared to be rather temporarily stable and no significant cross-sectional changes in the mean levels of the *ERSES* were found. One possible reason for the stability is a considerable overlap with personality dispositions. Indeed, a strong negative relation between self-esteem and neuroticism is well documented (Robins, Tracy, Trzesniewski, Gosling, & Potter, 2001; Schmitt & Allik, 2005). Judge, Erez, Bono and Thoresen (2002) proposed that self-esteem represents a general Neuroticism factor and contains only a small amount of unique information that goes beyond it. This indicates that self-esteem originates mostly from personality dispositions which, according to the Five-Factor Model of Personality (McCrae & Costa, 1999), are deeply rooted in biology and remain relatively stable throughout the whole course of life. The pattern of correlations between the *ERSES* and the Five-Factor model of personality dimensions emerged in Study VI similarly to the English-speaking samples, suggesting that the relationship between personality and global self-esteem is quite robust and not dependent on a particular language and/or culture. Thus, measures of global self-esteem seem to represent reasonably well a general neuroticism dimension as it is conceptualized in the Big Five approach. Placed

into a broader context of personality traits, the relative stability of global self-esteem across the span of life is less surprising.

However, recently Robins and his colleagues (2002) provided a comprehensive overview of age differences in global self-esteem from ages 9 to 90 using cross-sectional data gathered over the Internet. The results indicated that self-esteem levels were high in childhood, dropped during adolescence, rose gradually throughout adulthood, and declined sharply in old age. Moreover, data demonstrated that a similar life span trajectory of self-esteem generally held across gender, socioeconomic status, ethnicity, and nationality (Robins et al., 2002). Nevertheless, the results based on the national database ($n=30,063$) of the Estonian version of the *RSES* (Study VI) and the Single-Item Self-Esteem Scale (*SISE*) challenge this conclusion of a universal age trajectory of self-esteem as none of the four Estonian trajectories resembled any other trajectory portrayed in Figure 2 (Pullmann, Realo, & Allik, submitted for publication).

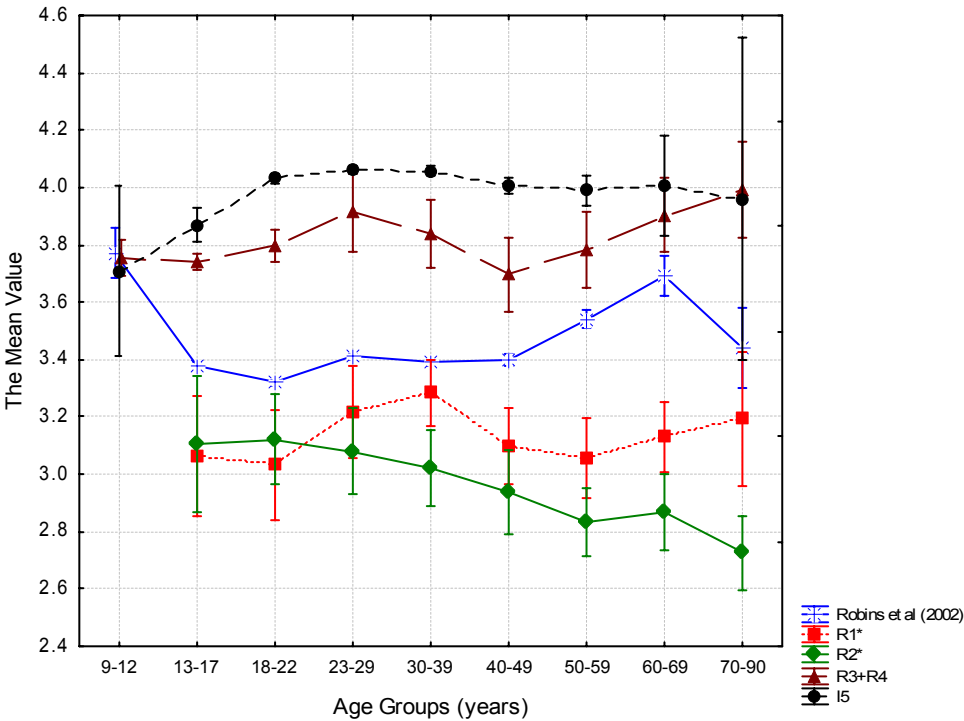


Figure 2. The cross-sectional life span trajectories of global self-esteem measured by the *ERSES* (Pullmann & Allik, 2000; a nationally representative sample R3+R4 and the self-selected Internet sample I5) and the *SISE* (nationally representative samples R1* and R2*). Vertical bars denote 0.95 confidence intervals. Data for the multinational Internet sample are adapted with permission of the author from “Global self-esteem across the life span”, by R. W. Robins, K. H. Trzesniewski, J. L. Tracy, S. D. Gosling, & J. Potter (2002), *Psychology and Aging*, 17, p. 429. Copyright 2002 by the American Psychological Association.

The results of a variance component analysis demonstrated that about 11% of variance in the *RSES* total scores was attributable to random factors (i.e., gender, sample type and their interactions) and only 3% to age differences. To conclude, the recent analyses confirm a more standard view according to which there are no systematic age differences in self-regard and, thus, do not support the idea of a universal trajectory of global self-esteem across the span of life (Pullmann et al., submitted for publication).

5.2. Relations between self-esteem and academic achievement

The measurement of self-esteem in academic context has always had several problems. One of the essential issues is the dimensionality of the construct. According to Lyon (1993), many of the contradictory findings may be partially a function of inadequate definition of the self-esteem construct. According to the multidimensional model of self-concept (Shavelson, Hubner, & Stanton, 1976), general and academic self-esteem are two separate concepts that share only a limited number of common attributes. Rosenberg and his colleagues (1995) emphasized that treating global and specific self-esteem as surrogates for one another may lead to incorrect conclusions since different aspects of self-esteem have strikingly different relevance and consequences. However, most research on self-esteem has focused on either the global or specific evaluations of the self-concept (Hoelter, 1986). Therefore, a further systematic investigation was essential to clarify inconsistent results reported in the literature concerning the relations of various aspects of self-esteem to external variables.

Study **VII** was designed to examine how various levels of self-esteem – general and specific – relate to the indicator of academic achievement. Traditionally, it has been reported that the relationship of global self-esteem to academic achievement is weak whereas academic self-esteem correlates significantly higher. However, Study **VII** demonstrates that the correlation between global self-esteem and school achievement is mainly due to another confounding variable – when students' assessments of their academic achievements are taken into account, the sign of the relationship between general self-esteem and academic achievement reverses.

Thus, Study **VII** reports that lower, not higher, general self-esteem may be beneficial for academic achievement. If students' evaluations of their academic achievements are taken into account, then low self-esteem becomes a significant predictor of good results in older grades. Academically more successful students may have a more critical outlook towards themselves, and in turn students with more modest academic abilities may compensate for their academic deficiency by elevating their general self-esteem.

CONCLUSIONS

Taken together, the main conclusions of this dissertation are the following:

- (1) The mean level of mental abilities of Estonian schoolchildren aged 7 to 18 years does not differ significantly from children of the same age living in Great Britain even after adjusting for possible secular changes (Studies **I** and **II**).
- (2) A systematic comparison of Estonian, British, and Icelandic growth trajectories in the nonverbal reasoning ability suggested that the development of intellectual capacities proceeds at different rates and the maturation process can take longer in some populations than in others (Study **III**).
- (3) The results confirmed Lynn's developmental theory of sex differences according to which in early adolescence girls outperform boys in their abstract reasoning ability but males have a small advantage from the age of 15 years onwards (Study **IV**).
- (4) Compared with the dramatic rise of intellectual capabilities occurring between 12 and 18 years of age, the development of personality traits seems to be practically frozen resembling the respective scores of adults. Only a small fraction of this change in the mean levels of personality traits was explained by age (Study **V**).
- (5) The self-reported personality trait structure matures and becomes sufficiently differentiated around age 14–15 and grows to be practically indistinguishable from adult personality by the age of 16 (Study **V**).
- (6) The Rosenberg Self Esteem Scale was successfully generalizable to Estonia and appeared to occupy approximately a similar location in the space defined by the Big Five personality traits (Study **VI**) as in earlier studies, suggesting that the relationship between personality and global self-esteem is quite robust and not dependent on a particular language and/or culture. Moreover, the results confirm a standard view according to which there are no systematic age differences in self-regard and, thus, do not support the idea of a universal and invariable trajectory of global self-esteem changes across the span of life.
- (7) If students' evaluations of their academic achievements are taken into account, then low, not high self-esteem becomes a significant predictor of good academic achievements in older grades. Academically more successful students may have a more critical outlook towards themselves, and in turn students with more modest academic abilities may compensate for their academic deficiency by elevating their general self-esteem (Study **VII**).

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SUMMARY IN ESTONIAN

EESTI KOOLILASTE VAIMSE VÕIMEKUSE JA ISIKSUSEOMADUSTE ARENG

Juhan Tork (1889–1980) oli esimene uurija, kes mõõtis 1930. aastatel suurearvulisel valimil Eesti õpilaste intelligentsust. Käesoleva dissertatsiooni peamiseks eesmärgiks oli taastada süstemaatilised psühholoogilised mõõtmised Eesti koolilaste seas ning uurida tänapäeva õpilaste vaimse võimekuse ja isiksuseomaduste kujunemist lapse- ja noorukieas. Sellest lähtuvalt keskenduvad väitekirja koondatud uurimused järgnevatel teemadel:

- Milline on Eesti koolilaste vaimne arengutase võrreldes nende eakaaslastega teistes riikides? Kas poisid lahendavad loogilist mõtlemist ja arutlusoskust nõudvaid ülesandeid tüdrukutest edukamalt?
- Kuidas muutuvad isiksuse põhiseadumuste keskmised tasemed ja struktuur noorukiea vältel?
- Kuivõrd stabiilne on üldine enesehinnang? Milline on üldise enesekohase suhtumise seos isiksuslike näitajate ning akadeemilise edukusega?

Usaldusväärsete tulemuste saamiseks koguti esmalt rohkearvuline ja laia vanuselise esindatusega andmebaas, mis oleks võimalikult representatiivne antud vanusegrupi eestikeelse elanikkonna suhtes. Esindusliku rahvusliku andmebaasi kogumiseks testiti aastatel 2001–2005 üle kaheksa tuhande 1.–12. klassis õppiva koolilapse kokku 51 koolist (tabel 2; sh kordustestitud). Seejuures jälgiti, et üldhariduskoolide puhul oleksid regionaalselt esindatud kõik Eesti maakonnad ning et lisaks linnadele oleks ka maapiirkondadel märkimisväärne osakaal. Kuigi käesolev dissertatsioon põhineb vaid üldhariduskoolide õpilaste andmetel tehtud läbilõike-uurimustel (1. ja 2. projekt), sisalduvad kogutud andmebaasis põhjuslike seoste uurimiseks ka longitudinaalsed andmed (3. ja 5. projekti raames teostati kokku 1813 kordustestimist) ning kutse- ja õhtukoolides õppivate noorte tulemused (4. projekt). Töö praktiliseks väljundiks on psühholoogiliste mõõtevahendite (nt Raveni Progresseeruvad Maatriksid, enesekohane isiksuseküsimustik *NEO-FFI*, Rosenbergi enesehinnanguskaala) normeerimine, mis võimaldaks nii teadlastel kui koolipsühholoogidel neid haridusmõõtmisel edaspidi rakendada.

Esitatud uurimustele tuginedes on väitekirja põhiseisukohad järgnevad:

- (1) Eesti 7–18 aasta vanuste koolilaste vaimse võimekuse tase ei erine oluliselt Suurbritannias elavate eakaaslaste vastavatest näitajatest (**I** ja **II** uurimus).
- (2) Eesti koolilaste üldise vaimse võimekuse arengutrajektoori süstemaatiline erinevus Suurbritannia ja Islandi samaealiste laste omadest viitab sellele,

et intellektuaalne areng kulgeb erinevates populatsioonides erineva kiirusega (**III** uurimus).

- (3) Tulemused kinnitavad üldvõimekuse sooliste erinevuste arengulist teooriat (Lynn, 1994, 1998, 1999), kuivõrd tüdrukud lahendasid varases noorukieas poistest edukamalt loogilist mõtlemist ja arutlusoskust nõudvaid ülesandeid, kuid alates 15. eluaastast saavutasid poisid mittesõnalises üldvõimekuse testis paremaid tulemusi (**IV** uurimus).
- (4) Kuigi vanuses 12–18 aastat toimub kiire vaimsete võimete areng, ei esine uuritud õpilastel võrreldes täiskasvanute vastavate näitajatega isiksuse baasomaduste keskmistes tasemetes olulisi muutusi. Nimelt on vaid tagasihoidlik osa enesekohase isiksuseküsimumstiku *NEO-FFI* skooride muutustest vanusega seletatav (**V** uurimus).
- (5) Viie-faktorilise isiksusemudeli struktuur on küll äratuntav juba 12-aastasatel, kuid eristub peamiselt 14–15 aasta vanuselt ning areneb täiskasvanute struktuurile sarnaseks 16. eluaastaks (**V** uurimus).
- (6) Kohandatud eestikeelse Rosenbergi enesehinnanguskaala seoste uurimine viie-faktorilise isiksuseküsimumstikuga kinnitab, et seostemuster üldise enesekohase suhtumise ja isiksuse põhiseadumuste vahel ei sõltu konkreetsest keeleruumist ning säilib sarnasena erinevates kultuurides (**VI** uurimus). Samuti toetavad tulemused traditsioonilist seisukohta, mille kohaselt ei esine üldises enesehinnangus süstemaatilisi arengulisi erinevusi.
- (7) Madal üldine enesehinnang osutub oluliseks õpiedukuse ennustajaks, kui võetakse arvesse vanemates klassides õppivate koolilaste enesekohased hinnangud akadeemilisele edukusele. Leitud paradoks on seletatav sellega, et õppetöös edukad õpilased on üldiselt enda suhtes kriitilisemad ning kehvemate õpitulemustega koolilapsed kompenseerivad seda puudujääki akadeemilises vallas oma üldise positiivse minapildi säilitamisega (**VII** uurimus).

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The Paradox of High Academic Achievement but Low Self-Esteem

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Summary. The present study demonstrates on a large and representative sample ($N=4,609$) of the Estonian students (Grades 2–12) and applicants that not high self-esteem but more critical feeling of self-worth may be beneficial for academic achievement. Starting from Grade 8, when students' evaluations pertaining to their academic competence are taken into account, the low general self-esteem becomes the significant predictor of superior academic achievement measured by the Grade Point Average. It is more likely to explain the present paradox by compensatory mechanisms: academically more successful students have more critical outlook towards themselves and students with more modest academic abilities compensate their academic underachievement by elevating their general self-regard.

INTRODUCTION

Despite popular beliefs that high self-esteem facilitates academic achievement, only a modest correlation has been proven to exist between general self-esteem and school performance (Byrne, 1984; Byrne & Shavelson, 1986; Hansford & Hattie, 1982; Kugle, Clements, & Powell, 1983; Marsh & Young, 1998; Mintz & Muller, 1977). A recent meta-analysis estimated that the effect of the favorable influence of positive self-beliefs on academic achievement is modest and the overall estimated relation is about .08 (Valentine, Dubois, & Cooper, 2004). Also longitudinal studies do not point to any significant role for self-concept in the advancing of academic performance (Bachman & O'Malley, 1977; Byrne, 1986; Helmke & van Aken, 1995; Maruyama, Rubin, & Kingsbury, 1981; Pottebaum, Keith, & Ehly, 1986; Skaalvik & Hagtveg, 1990). Educational practices attempting to boost children's self-worth have demonstrated only limited and temporal effects. Based on these observations, Baumeister and his colleagues (2003) concluded that generalized evaluation of self-worth has no significant impact on the subsequent academic achievement.

According to the multidimensional model of self-concept (Shavelson, Hubner, & Stanton, 1976), general and academic self-esteem are two separate con-

cepts that share only a limited number of common attributes. While global self-esteem appears to be heavily affective in nature and tends to be associated with overall psychological well-being, specific self-esteem – that is self-evaluations in narrowly defined domains like school performance – appears to have a more cognitive component and tends to be more strongly associated with behavior or behavioral outcomes (Rosenberg, Schooler, Schoenbach, & Rosenberg, 1995). This means, in particular, that general self-regard is only partly based on the student's evaluation of their school performance while self-assessment of their academic abilities is sufficiently accurate to reflect their achievement at school.

The present study questions the reached consensus about the lack or only modest correlation between general feeling of self-worth and academic performance. We are going to demonstrate in a large nationally representative sample that there may be a strong and systematic relationship between general self-esteem and school achievement. Surprisingly, in the academic context this correlation is negative, but not positive: following the certain age students with lower non-academic self-regard tend to achieve better objective results at school than those with higher global self-esteem. We conclude that the modest or deficient correlation between general self-esteem and academic performance is mainly due to another confounding variable – the true relationship becomes transparent when academic self-esteem is controlled for and partialled out from overall feeling of self-worth. When students' assessment of their academic achievement is taken into account, the sign of relationship between general self-esteem and academic achievement reverses: those adolescents who excel at school tend to have relatively modest self-acceptance compared to those who are less successful in their studies.

METHOD

Participants

Three samples with a total of 4,609 Estonian students and applicants participated in this study. The valid number of participants with their mean ages across the grades has been reported in Table 1.

First, the sample of 1,857 Estonian elementary school children (Grades 1, 2, 3, and 4) was tested in 2002. The sample was drawn from 17 socially and geographically representative schools from all over Estonia, including the capital city of Tallinn, different towns, and rural areas. Although the first graders participated in the project, they were not yet given grade marks in most of the schools and, therefore, were excluded from being studied in relation to academic achievement. A total of 1,435 children (682 girls and 753 boys) from Grades 2, 3, and 4 were included in this study, with the mean age of 9.43 ± 1.04 (ranging from 7 to 11) years. The written permission was obtained from their parents.

Second, the sample of 2,746 Estonian adolescents (1,466 girls and 1,280 boys) attending Grades 6, 8, 10, and 12 was tested in 2001. The sample was drawn from 27 Estonian-speaking public secondary schools and gymnasiums from different regions of Estonia, covering all the 15 counties, the capital city of Tallinn, several towns, and rural areas. The mean age of this sample was 14.93 ± 2.04 , ranged from 11 to 19 years.

The third sample consisted of 969 individuals (732 females and 237 males) who were applying for admission to the Faculty of Social Sciences at the University of Tartu in the years 1998 and 1999. The applicants' age ranged from 17 to 40 with the mean age of 19.2 ± 2.01 years and they have finished an Estonian-speaking public secondary school or gymnasium all over Estonia. The participation in psychological testing was voluntary.

Measures

Academic achievement was measured through the Grade Point Average (*GPA*), which was computed on the basis of the mark grades of principal subjects (a) obtained during the two half terms for the first and second samples or (b) based on the final school report from the finished secondary school for the applicants. There is a 5-mark grading system in Estonia ranging from 1 (*very weak*) to 5 (*very good*). The basic education (Grades 1–9) is obligatory in Estonia followed by an upper secondary (gymnasium with Grades 10–12) or a vocational secondary school.

Global self-esteem was measured by the Estonian version of the Rosenberg Self-Esteem Scale (*RSES*; Pullmann & Allik, 2000). Items of the *RSES* were answered on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The internal reliabilities (Cronbach α) of the scale were .81 and .84 for the second and applicant's samples, respectively. For the children's sample, a modified and more readable version of the *RSES* was constructed in order to make the instrument more appropriate for the respondents of younger age. The original items of the *RSES* were restated using shorter and simpler analogues (e.g. the item "*I feel I'm not a person of worth, at least on an equal plane with others*" was replaced with "*I'm as useful as others*"). Additionally, the 5-point rating scale was replaced with a shorter version (*1 = disagree, 2 = sometimes, 3 = agree*). The internal reliability of the modified *RSES* was .71 in the first sample.

Academic self-esteem was measured on the 8-item scale (*AcSES*) developed to assess students' academic self-esteem or perception of self-competence in the academic domain. Typical items in this measure include "*I am/was one of the best students of my class*" and "*I do well in most school subjects*". Agreement with each item was rated on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores represented higher level of academic self-esteem. The internal reliabilities (Cronbach α) of the scale were .78 and .75 for the second and applicant's samples, respectively. Similarly to general self-

esteem measure, a modified and more readable version of the *AcSES* using the 3-point rating scale was constructed for the children's sample (e.g. the item "*I feel confident of my academic abilities*" was replaced with "*I'm a clever pupil*"). The internal reliability of the modified *AcSES* was .71.

RESULTS

The mean level of academic achievement (*GPA*) regularly decreased through all the grades starting from the highest value of 4.50 in Grade 2 and reaching its lowest value of 3.80 in Grade 12 (Table 1). As expected, the applicants to university had significantly higher *GPA* than secondary school leavers ($d = .69$, $p < .001$). Across all samples, girls had significantly higher *GPA* than boys [$m = 4.17$ vs 3.82 , respectively; $t(4600) = 19.66$, $d = .59$, $p < .0001$] and this advantage of girls remained in each grade. Unlike school achievement, there were no significant sex differences in the mean scores of the *RSES* to measure the general self-esteem in any age groups. The Pearson product moment correlation between general self-esteem and academic achievement slightly increased with age reaching the highest value in Grade 6 ($r = .42$, $p < .001$) and declined rapidly afterwards. In Grade 10, the overall self-worth explained only about 4% of the total variance of academic success. Moreover, among the secondary school leavers (Grade 12) and in the applicant sample the correlation between the *RSES* and *GPA* became insignificant (Table 1).

Unlike general self-worth, the students' academic self-evaluation (*AcSES*) was steady related to academic achievement reflecting quite accurately their performance at school. The Pearson correlation between the *AcSES* and *GPA* remained close to the mean correlation of .53, ranging from .39 to .64 through the studied age range. Similarly, the relation between general and academic self-esteem also remained stable at about the mean correlation of .55 across all the grades and samples, indicating that individuals more confident of their academic abilities tended to rate their general feeling of self-worth more favorably.

Surprisingly, the relation between general self-esteem and academic achievement decreased dramatically when the students' evaluation of their academic abilities was partialled out (*RSES** in Table 1). In the junior grades (2nd, 3rd, 4th, and 6th), the significant positive correlations between the *RSES* and *GPA* dropped close to zero and the partial correlations became insignificant. Moreover, in the older grades (8th, 10th, and 12th) and in the applicants' sample the partial correlations became reverse: when academic self-esteem was taken into account the partial correlations between the *RSES* and *GPA* were significantly negative. Thus, starting from Grade 8 students with lower global self-esteem are generally more successful in their academic studies than those who have more positive overall opinion about themselves.

Table 1. Relations of academic achievement to global and academic self-esteem.

Grades	<i>N</i>	Mean Age	Mean <i>GPA</i>	Pearson correlation		Partial correlation	
				<i>RSES</i>	<i>AcSES</i>	<i>RSES*</i>	<i>AcSES*</i>
2 nd	364	8.3	4.50	.28***	.39***	.04	.30***
3 rd	390	9.4	4.41	.24***	.47***	-.09	.39***
4 th	439	10.4	4.30	.33***	.60***	-.03	.52***
6 th	620	12.4	3.98	.42***	.64***	.05	.53***
8 th	706	14.4	3.85	.28***	.64***	-.12**	.60***
10 th	642	16.1	3.82	.20***	.55***	-.17***	.54***
12 th	494	17.8	3.80	.09	.46***	-.19***	.49***
Applicants	954	19.2	4.16	-.02	.50***	-.24***	.54***
Total	4,609	14.2	4.02	.20***	.53***	-.11***	.51***

Note. ** $p < .01$, *** $p < .001$; *N* = number of valid cases; *GPA* = Grade Point Average; *RSES* = Rosenberg Self-Esteem Scale; *AcSES* = Academic Self-Esteem Scale; *RSES** = Rosenberg Self-Esteem Scale controlled for the *AcSES*; *AcSES** = Academic Self-Esteem Scale controlled for the *RSES*.

To explore how general self-esteem could become negatively correlated with academic achievement, all participants within the same grade/sample were divided into three groups (low, medium, and high) on the basis of the tripartite split (33 and 66 percentiles) of their *RSES* and *AcSES* scores. Figure 1 demonstrates graphically the relation between the *RSES* and *GPA* when student's academic self-esteem is controlled. The left panel (A) summarizes data for junior grades, the middle panel (B) for older grades, and the right panel (C) for the applicant sample.

The most transparent tendency was revealed in the applicant sample with all three sets of data exhibit a clear negative slope, though, the Pearson correlation between the *RSES* and *GPA* was close to zero ($r = -.02$, ns) in this sample. Therefore, the results indicated that applicants with a low level of global self-esteem (*RSES* Low) had higher academic achievement compared to those students with a more positive general self-regard (*RSES* High) when their academic self-esteem was taken into account. This difference between the high and low self-esteem groups remained statistically significant ($p < .001$) regardless of applicants' level of academic self-esteem.

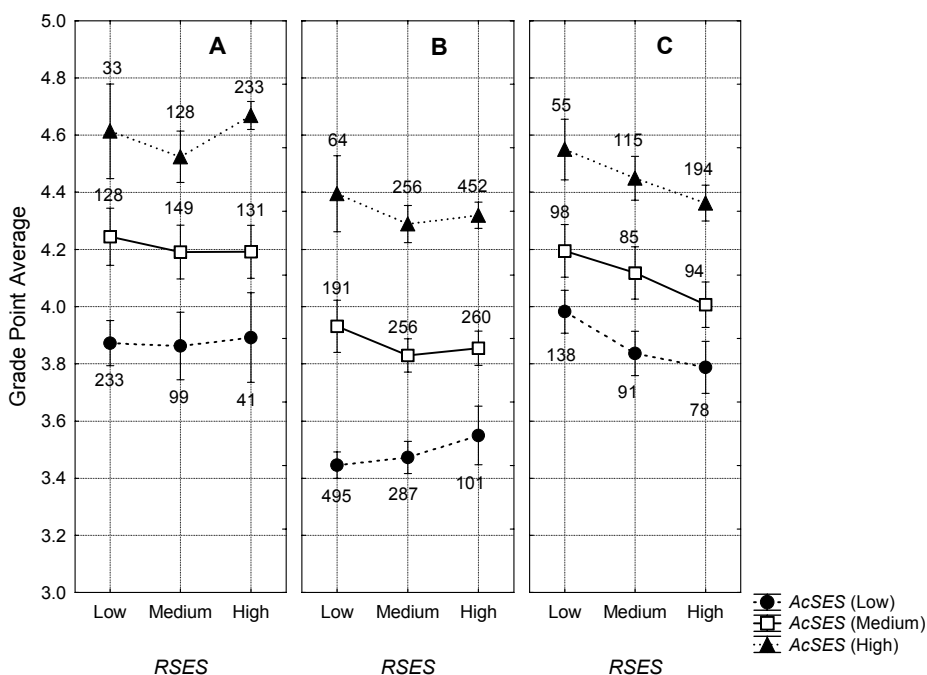


Figure 1. Relationship between academic achievement and global self-esteem when academic self-esteem is taken into account. RSES = Rosenberg Self-Esteem Scale; AcSES = Academic Self-Esteem Scale. Vertical bars denote 0.95 confidence intervals. Numbers near to each data point show the number of participants. Panels: A – Grades 2, 3, 4, and 6; B – Grades 8, 10, and 12; C – applicants.

It is instructive to scrutinize the numbers close to each datapoint reporting the number of students in each category. For example, among the applicants with the medium level of academic self-esteem (the middle set of data) there was approximately equal number of students with low (98), medium (85), and high (94) level of general self-esteem. These three groups, however, had rather different objectively measured performance at school: the students with the lowest general self-esteem were the most successful and applicants with the highest opinion about their self-worth had obtained the worst school marks.

Altogether, the 2-way ($RSES \times AcSES$) analysis of variance confirmed that there was no interaction between global and academic self-esteem in relation to academic achievement for the samples, $F(4,4594) = 1.73, p = .14$.

DISCUSSION

The main finding of the present study is surprising: opinions about worthiness as human being tend to be inversely related to school achievement provided that the assessment of academic abilities has been taken into account. In older grades, students with lower overall self-esteem were more likely to obtain better results at school when their self-feeling about academic competence was partialled out. This significant negative correlation between the academic achievement and general self-esteem is masked when general self-acceptance is measured alone without asking students' opinion about their academic abilities.

This is certainly not the first paradox of self-esteem (cf. Baumeister, 1993; Higgins, Snyder, & Berglas, 1990). Low general self-esteem among minorities, particularly Black American, has been considered a self-evident truth. Nevertheless, systematic reviews have shown that neither African Americans nor minorities living in the Western countries have lower general self-esteem (Gray-Little & Hafdahl, 2000; Porter & Washington, 1993; Twenge & Crocker, 2002; Verkuyten, 1994; Verkuyten, 2005). Although African Americans have lower academic outcomes they typically have higher general self-esteem compared to White Americans (Osborne, 1995; Van Laar, 2000). A similar discrepancy is found between the academic achievement of men and women and their overall self-regard. Like many previous reports (Kling, Hyde, Showers, & Buswell, 1999), boys in the current study received lower grades than girls but their sense of self-worth did not suffer from this disadvantage. It is also most evident that overweight, particularly in adolescence, may have deleterious effects on subsequent self-esteem, social status, and physical health. Nonetheless, no evidence of an effect of overweight on self-esteem was found in a nationally representative sample of 10,039 randomly selected young people (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). Thus, there are several situations in which self-esteem is different to what could be expected by common sense or expert knowledge.

In most cases, the self-esteem paradoxes are solved by attributing to self-esteem some adaptive functions. For example, the most likely explanation for the fact that self-esteem of African Americans does not suffer from poorer academic outcomes is academic disidentification (Steele, 1988, 1997). It was proposed that African American children detach their self-esteem from academic outcomes, thus, protecting them from feeling of failure. For instance, analyses of data taken from a nationally representative longitudinal study of American students revealed a pattern of weakening correlations between self-esteem and academic outcomes from Grades 8 to 10 for African American students whereas the correlations for White students remained relatively stable (Morgan & Mehta, 2004; Osborne, 1995, 1997). Data of the present study indicated similar process of disidentification among Estonian schoolchildren. Starting from Grade 8, the correlation between global self-esteem and academic outcome weakened and became virtually zero among high-school graduates. The mentio-

ned data seem to suggest that Estonian students tend to disassociate their general feeling of self-worth from their academic successes and failures during their studies. This, however, is a misleading conclusion. As soon as the self-reported evaluations to their academic performance were taken into account, the association between general self-esteem and academic achievement became insignificant (younger students) or substantially negative (older students). Thus, the academic disidentification among Estonian schoolchildren is more apparent than real, disappearing after academic self-esteem is properly controlled for.

There are two possible lines of explanation why low global self-esteem does not necessarily mean poor academic performance, and these two lines are not necessarily incompatible with each other. First, it is possible that more intelligent and academically successful students have more critical outlook towards themselves. Second, students with more modest academic abilities compensate their academic deficiency by elevating their general self-esteem.

Individuals with different cognitive abilities use their intellectual resources for different purposes (Allik & Realo, 1997). For example, students with higher cognitive abilities and superior academic results seem more likely to reflect on and be aware of their own thought and feelings (Hattie, 1992). Being aware of their shortcomings, they are less certain and more critical about themselves and therefore rate themselves lower on the general self-esteem. "The greater one's awareness of falling short of personal standards of correctness, the lower self-esteem" (Hattie, 1992, p. 47).

Perhaps another way how to describe the elevated self-criticism is defensive pessimism (Norem & Cantor, 1986; Cantor & Norem, 1989). It is likely that academically talented students may strategically set low their expectations towards their academic achievements. They do so in order to protect themselves from the consequences of failure. These low expectations, however, do not become self-fulfilling prophesies and self-handicapping. Defensive pessimism strategy does not lead to correspondingly low academic performance, in the present case at least. It seems to be a universal rule that most students have higher opinions of their abilities than could be supported by their actual academic performance. This positive bias stems from a universal need for self-enhancement and can be hardly be called realistic. In the view of the universality of the self-enhancement, it is not entirely clear how it is compatible with the defensive pessimism strategy. One explanation seems to be its selectivity: the negative correlation between the *RSES* and *GPA* is most likely observed among the sample of academically most able students. Indeed, the negative association was most clearly seen among applicants to university whose grades were significantly higher than the average high-school graduate, and also among high-schoolers with superior academic results.

Why poor academic performance does not necessarily lead to low overall self-esteem? One of the primary functions of general self-esteem appears to be the compensation of weaknesses in specific domains. As Rosenberg (1982) wrote, an individual "will be disposed to value those things at which he

considers himself to be good and to devalue those qualities at which he considers himself poor” (p. 528). Consequently, use of compensatory strategies by academically less talented individuals may help to explain, however, why they have generally higher self-esteem than their peers who have better school results. It may be the same reason why stigmatized groups do not necessarily have low self-esteem and why self-esteem does not decline with age although elderly people experience health problems and decline in their abilities (Crocker & Wolfe, 2001). Specifically, in order to compensate weaknesses in their academic achievements students are stressing their overall self-worth.

To conclude, so far the compensatory mechanisms like defensive pessimism and self-protective enhancement have been used to resolve the paradox why members of various stigmatized groups do not have low global self-esteem (Crocker & Major, 1989). The present study demonstrates for the first time on a large and representative sample that lower, not higher general self-esteem may be beneficial for academic achievement. If students’ evaluations of their academic achievements are taken into account, then low self-esteem becomes a significant predictor of good results in older grades. Academically more successful students may have more critical outlook towards themselves, and in turn students with more modest academic abilities compensate their academic deficiency by elevating their general self-esteem. Although this result may be specific to Estonian students and grading system alone, we do not possess data that could support the present explanation.

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List of Publications

- Allik, J., Laidra, K., Realo, A., & **Pullmann, H.** (2004). Personality development from 12 to 18 years of age: The mean levels and structure of traits. *European Journal of Personality*, 18, 1–18.
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- Allik, J., **Pullmann, H.**, & Realo, A. *Geography of self-esteem: A pattern within a culture*. Poster presentation at the 10th Biennial Meeting of International Society for Studies for Individual Differences, July 7–11, 2001, Edinburgh, UK.
- Allik, J., Laidra, K., Realo, A., & **Pullmann, H.** *Personality development from 12 to 18: Changes in mean levels of traits and in their structure*. Poster presentation at the 11th European Conference on Personality, July 21–26, 2002, Jena, Germany.
- Laidra, K., **Pullmann, H.**, & Allik, J. *Intelligence and personality as predictors of academic achievement*. Poster presentation at the 9th European Congress of Psychology, July 3–8, 2005, Granada, Spain.
- Pullmann, H.**, & Allik, J. *Personality types corresponding to patterns of specific and global self-esteem*. Poster presentation at the 11th European Conference on Personality, July 21–26, 2002, Jena, Germany.
- Pullmann, H.**, Realo, A., & Allik, J. *Changes in global self-esteem across the life span*. Poster presentation at the 11th Biennial Meeting of International Society for Studies for Individual Differences, July 13–17, 2003, Graz, Austria.
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2001–2005 projektijuht, õppeülesande täitja, psühholoogia osakond, Tartu Ülikool
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Teadustegevus

Teadustöö põhisuunad:

- enesehinnang
- vaimne võimekus
- isiksus

Kuulumine erialastesse organisatsioonidesse:

- Eesti Psühholoogide Liit
- Eesti Käitumis- ja Terviseteaduste Keskus
- MINA uurimiskeskus (*SELF Research Centre*)