Master Thesis Economics and Business (Policy Economics)

BOYS; BEING INTELLIGENT IS NOT GOOD ENOUGH

DO NON-COGNITIVE SKILLS LEAD TO A DIFFERENCE IN SECONDARY SCHOOL TRACK ADVICE BETWEEN BOYS AND GIRLS?

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Abstract

This study looks at the difference in secondary school track advice between boys and girls, and to what extent cognitive and non-cognitive skills determine this advice. Data about cognitive test scores and non-cognitive skills from primary school children in The Netherlands was used to estimate what determines secondary school track advice. The results show a strong positive relation between cognitive skills –through test-scores- and track advice. When I control for cognitive skills, girls get a higher secondary school track advice than boys. However when I further control for non-cognitive skills, this effect disappears. This implies that non-cognitive skills have a strong effect on determining secondary school track advice and can explain the effect of girls getting an advice for higher educational levels than boys. This effect is found for both immigrant children and native Dutch children, but is stronger for native Dutch children. The effect of girls getting a higher secondary school track advice, due to their higher scores on non-cognitive skills, is evident in all years of the dataset but weakens a bit in the later years.

1. Introduction

Girls are overtaking boys in educational performance. This research focuses on the driving factors behind this phenomenon. In the past decades we have seen a change in education path between men and women. In the seventies more boys were following (higher) education, girls were lagging behind. Only one out of four University students in the Netherlands was female in the early seventies (Jungbluth, 1981). Nowadays we see the opposite: more girls following (and finishing) higher tracks of education. Since the 1990s we see this trend in all developed countries, boys lagging behind girls not only in terms of completion but also in learning achievement rates (Jha, Bakshi, & Martins Faria, 2012).

This paper will focus and use data on children in the Netherlands. When looking at secondary education, in 2011 Dutch girls were more likely than boys to finish secondary school on a high level. 53.8% of all the girls against 47.2% of all the boys who got a secondary school diploma, finished HAVO or VWO, the two highest secondary school tracks in the Netherlands[1] (CBS , 2012). It is interesting to know how this discrepancy can arise when boys and girls in developed countries score the same on cognitive tests like intelligence quotient tests (Claessen, 2013), or when boys score even higher (Irwing & Lynn, 2005). It thus seems that boys are not low achieving but so-called underachieving. With underachieving we mean that 'school performance, usually measured by grades, is substantially below what would be predicted on the basis of the student's mental ability, typically measured by intelligence or standardized academic tests' (McCall, Evahn, & Kratzer, 1992). The statement that girls are smarter than boys would be oversimplifying, therefore I explore the reasons of these differences in this paper. It is not only important to see what explains the underachievement of boys, but also where in the education career this difference between boys and girls first emerges.

[1] HAVO stands for *Hoger Algemeen Voortgezet Onderwijs*. VWO stands for *Voorbereidend Wetenschappelijk Onderwijs.*

This paper will focus on the first phase of tracking in the Dutch education system: the transition between primary school and secondary education. Tracking is defined as the process of separating pupils by academic ability into different groups or classes for all subjects (Gamoran, 1992). This paper will further investigate whether the difference in education level between boys and girls can be found in differences in non-cognitive skills between boys and girls. Non-cognitive skills yield personal attributes that are not measured by IQ tests or achievement tests. Non-cognitive skills include soft skills, personality traits, character skills and socio-emotional skills (Kautz, Heckman, Diris, Ter Weel, & Borghans, 2014). Non-cognitive skills have been found to be important for future life outcomes. Can non-cognitive skills explain the underachievement of boys and the difference in secondary school track advice between boys and girls? For this purpose an observational study of primary school children in The Netherlands is used, to see how children score on cognitive tests and which value teachers give them on non-cognitive skills. I investigated whether girls get higher school advices than boys and to what extent the differences can be explained by cognitive and non-cognitive factors. I further look if the effect is consistent over time and if there is a difference between immigrant and Dutch children and between different sub-groups.

The results show that when determining the secondary school track advice for a child both cognitive skills and non-cognitive skills play/have an important role. Girls are often –while controlling for cognitive skills– given a higher secondary school track advice than boys. However when I control for non-cognitive skills the effect of girls getting a higher advice disappears. This implies that non-cognitive skills can explain the differences between boys and girls in secondary school track advice. This effect is found for both immigrant children and native Dutch children, but is stronger for native Dutch children. The effect of girls getting a higher secondary school track advice, because they score higher on non-cognitive skills, is evident in all years of the dataset but weakens a bit in the later years. With these results the research shows the importance of non-cognitive skills in determining an educational path; it further shows that in the first phase of tracking already the differences between boys and girls comes forward. Because boys do not achieve up to their cognitive

potential, this raises the question to what extent the primary education system in the Netherlands is suitable for boys.

This paper is further organized as follows. The next chapter reviews the existing literature in more detail. In chapter 3 the background and strategy will be explained. The dataset used will be described in the fourth chapter, followed by the results in the fifth chapter. Based on these results, the paper ends with a conclusion and discussion chapter.

2. Previous studies

With my research I will explore a new research area. Similar studies can be found but this research is unique in that it focuses at the transition between primary school and secondary school. It thereby looks to what extent non-cognitive skills can determine the tracking advice for secondary school and whether a difference between boys and girls can be found. This section reviews previous literature on the importance of cognitive and non-cognitive skills in explaining educational outcomes and tracking decisions and how non-cognitive skills can differ between boys and girls.

Difficulties with measuring non-cognitive skills

Cognitive skills are not difficult to measure. There are a lot of standardized achievement tests on which tracking decisions could be solely based. Nowadays however we see that the tracking decisions made do not always fit with results on cognitive test scores, this means that tracking decisions seem not to be based purely on cognitive skills. The disparity between test-scores and tracking decisions may be explained by the influence of non-cognitive skills. Non-cognitive skills besides cognitive skills often play an important role in explaining educational outcomes (Bertrand & Pan, 2011). However measuring non-cognitive skills is more difficult than measuring cognitive skills. Non-cognitive skills of pupils cannot be measured with a standardized test, but are instead based on the evaluation of teachers. In their overview paper Kautz et al. (2014) review recent literature on measuring and fostering cognitive and non-cognitive skills. The authors show that

achievement tests do not adequately capture valuable non-cognitive skills, which means that achievement tests do not have the ability to predict important life outcomes.

The importance of non-cognitive skills

Non-cognitive skills valued by the assessment of teachers, are an important determinant in track decisions. Feron, Schils, & Ter Weel (2013) looked into objective and subjective assesment measures and their relation to track decisions. They use a model where track placement is a linear function of objective and subjective assesment and control variables. A standardized test-score, the CITO-test, is used for the objective assessment. They find that when making a track decision the subjective assessment, which is specified as the teacher's assessment of the child, is twice as important as the objective assessment. In another but similar paper in terms of research and results, Feron, Schils, & Ter Weel (2014) show that secondary schools also put more emphasis on subjective assessments than on the cognitive test score when making a track decision. They further show that subjective assessments are also a better predictor of the longer term career in secondary school and children who are allocated according to the teacher's assessment are the least likely to switch tracks. So non-cognitive skills are not only an important determinant in track decisions, track decisions are also better when non-cognitive skills are taken into account. Bernardi, Bratti, & De Simone (2014) further support this notion. They questioned if children, who have to choose a school track, have all the relevant information they need. In their paper the use of a system that gives information on students' cognitive and non-cognitive individual abilities, called Arianna, was employed. The dataset used by the authors has information on pre-test school track preferences and actual choices of school tracks. The authors then used a probit-model to understand whether Arianna's advice was valuable for the actual track choice or not. They found that children who made track choices in line with Arianna's suggestions were less likely to be retained in the first year of their next education. Thereby they showed Arianna allowed students and their families to make better school track choices.

Boys perform worse than girls on non-cognitive dimensions

Boys more often face a deficit of non-cognitive skills than girls, which can lead to underachievement in schooling as is described by Bertrand & Pan (2011). They further

find that a big difference in non-cognitive skills between gender is not purely biological, but instead subject to very strong environmental influences, particularly to the situation at home. Boys lag behind in behavioral and social-emotional skills that can lead to different approaches to learning, interpersonal skills, externalizing and internalizing problems and to self-control problems. This could also be the reason that we see more boys dealing with ADHD[2] (Bertrand & Pan, 2011) and more boys in special education forms (Driessen & Van Langen, 2013). Driessen & Van Langen investigated to what extent the position of boys and girls in primary and secondary education differs and whether this difference became more evident in the past few years. They standardized the differences between boys and girls such that the various outcomes could be compared. They find that boys and girls in primary school do differ in cognitive competencies, but that these differences are very small. On non-cognitive competencies, looking at work attitude and social behavior, girls are again evaluated as stronger.

Non-cognitive deficiencies can also lead to underachieving in higher education. Jacob (2002) found that non-cognitive skills account for a big part of the gender gap in higher education, controlling for the greater incidence of school disciplinary and behavioral problems among boys explains a substantial share of the female advantage of college enrollment. That means more women following higher education. As explained before, non-cognitive skills are difficult to measure and depend on the assessment of teachers. Cornwell, Mustard, & Van Parys (2012) shine light on the teacher's role in assessing academic achievement. They regress the relationship between gender and academic achievement and find that there is a misalignment of grades and test scores, which can be linked to gender differences in non-cognitive development. Boys who perform equally well as girls are graded lower by their teachers. When the authors control for non-cognitive assessments, the relationship between cognitive tests and the teacher's prediction of academic achievement is similar for boys and girls. This indicates that the assessment of non-cognitive skills is a strong determinant of the assessment of academic potential.

[2] ADHD stands for *Attention Deficit Hyperactivity Disorder*

Explanation and development of the backlog of boys in non-cognitive skills

Bertrand & Pan (2011), who explain the gender gap in non-cognitive skills by social and environmental influences instead of biological reasons, find that the problem of boys lagging behind in non-cognitive skills already occurs in early education. They believe that schools expect too much from boys at a very young age while their brain is not as matured as the girls' brain. It is therefore useful to know how we can design an education policy that improves boys' non-cognitive skills in early stages of education. In her paper Segal (Segal, 2008) looked to what extent non-cognitive skills can be improved and if policies aimed to improve non-cognitive skills can be useful. She measured non-cognitive skills by looking at adolescent behavior in the classroom. Adolescent behavior was evaluated by the teachers and focused on tardiness, inattentiveness, disruptiveness, homework completion, and absenteeism. Segal shows that both family and school behavior are important determinants of youth behavior in the classroom.

Teachers in primary education classrooms are often female and female kindergarten teachers seem simply less able or less willing to handle the behavioral and emotional needs of boys as is stated by Dee (2006). That can lead to a further backlog of boys' non-cognitive skills, which worsens the non-cognitive discrepancy between boys and girls.

In sum, the lessons learned from the previous literature about the difficulties of measuring non-cognitive skills, the differences in non-cognitive skills between boys and girls and the role of non-cognitive skills and cognitive skills in explaining educational outcomes are employed in this paper. This paper further contributes to the literature in that it sheds light on the first phase of tracking in the Dutch educational system and looks whether in that phase already the importance of non-cognitive skills and differences between boys and girls can be found.

3. Background and Empirical Strategy

Dutch Education System

This paper focuses on the transition from primary education to secondary education. Dutch primary education consists of eight grades (with two grades of pre-school) and

children are in primary school from age four to twelve. When children are in the final grade of primary school, they are given an advice with respect to the most suitable type of secondary education track to follow. Secondary schools eventually make a decision about the track placement, by making this decision they rely on a cognitive test, the CITO end test primary education (from now on CITO-test), but also on the assessment of teachers. The first tracking takes place at the age of twelve. The Netherlands is therefore known to have a system of early tracking.

In the current Dutch Education System pupils can follow three main tracks, or levels, of secondary schools:

- VMBO: preparatory middle-level vocational education, a four year path. VBMO is further divided into four different tracks:
    - BBL: Basic vocational programme;
    - KBL: Middle management vocational programme;
    - GL: combined programme;
    - TL: Theoretical programme.
- HAVO: higher general continued education, a five year path
- VWO: pre-university secondary education, a six year path[3]

For pupils who are expected not to obtain a VMBO-degree, there is Practical Training (PRO). There is also special secondary education for those with further special needs.

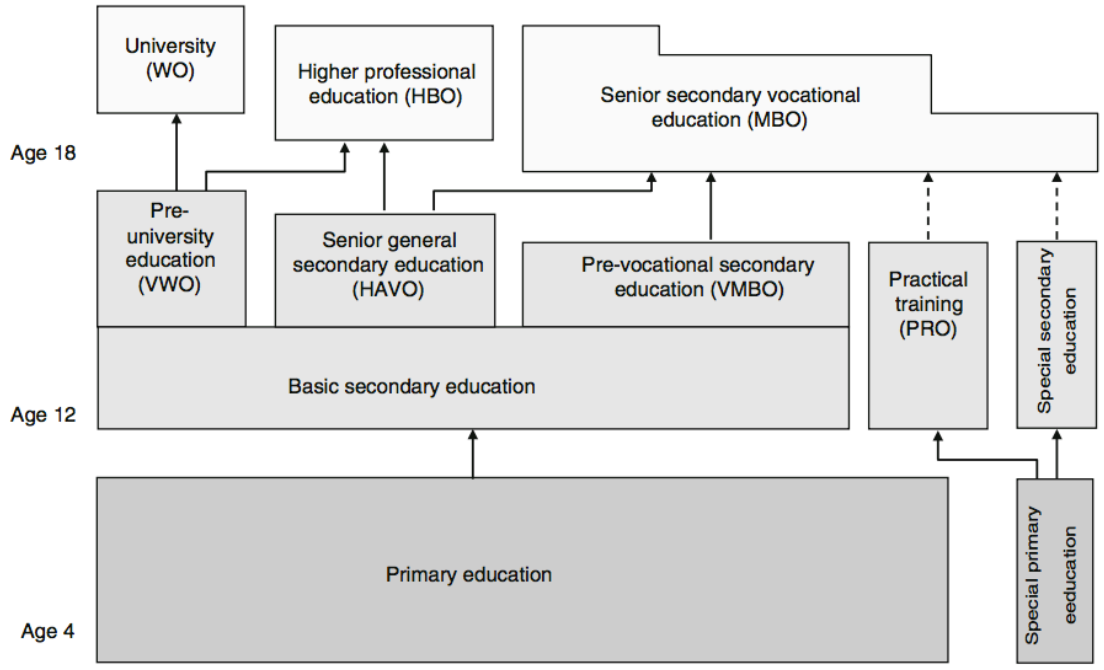
In the first grade of secondary school pupils can often also enroll in combined tracks, like VBMO/HAVO or HAVO/VWO. After one year it is decided which track is better suited for them and from year two they continue in that track.

In the old Dutch education system, VMBO did not exist. VMBO was divided into prevocational education (VBO) and junior general secondary education (MAVO). For

[3] VMBO stands for *Voorbereidend Middelbaar Beroepsonderwijs*. BBL stands for *Basisberoepsgerichte Leerweg*. KBL stands for *Kaderberoepsgerichte Leerweg*. GL stands for *Gemengde Leerweg.* TL stands for *Theoretische Leerweg*. HAVO stands for *Hoger Algemeen Voortgezet Onderwijs*. VWO stands for *Voorbereidend Wetenschappelijk Onderwijs.* PRO stands for *Praktijkonderwijs.*

children with special needs there was special education (VSO). In 1999, VBO and MAVO were combined to create prevocational secondary education (VMBO).[4]

Fig. 1: An overview of the Dutch Education System. (Ministerie van OCW, 2007)



The level of tertiary education depends on the level of secondary education attended. After having followed VMBO pupils can progress to a middle-level vocational or general education (MBO), when they have finished HAVO they can follow higher professional education (HBO). When pupils have finished VWO, they can attend university (WO).[5] Figure 1 shows how tracking further works in the Dutch Education System, however tertiary education is not a part of this study.

CITO End Test Primary Education

At the end of primary school (in the 8th grade), as is obliged from spring 2015, children have to take an end-test to determine objectively their achievement-level. The government

[4] VBO stands for *Voorbereidend Beroepsonderwijs*. MAVO stands for *Middelbaar Algemeen Voortgezet Onderwijs.* VSO stands for *Voortgezet Special Onderwijs*
[5] MBO stands for *Middelbaar Beroepsonderwijs*. HBO stands for *Hoger Beroepsonderwijs*. WO stands for *Wetenschappelijk Onderwijs*.

wants a compulsory test, because a test can show the level of each child in language and math at the end of primary school, a test should also show which kind of secondary school fits a child (De Rijksoverheid, 2014). The most commonly used measurement test is the CITO-test. This test is used by approximately 85% of the primary schools. On a yearly basis, for every school in the same period, almost all 8th grade pupils in the Netherlands take this test. The CITO-test measures cognitive skills and consists of 4 components: reading, math, study skills & science. The results on the CITO-test lie on a scale between 501 and 550. The degree of difficulty of the objective test is about the same every year. The test is calibrated every year to ensure that pupils' average score on the test is comparable across different years. In the more recent years, boys scored a little higher than girls on the CITO-test (Cito, 2013).

Since the CITO-test (or another end-test) has become compulsory it seems as if more weight is given to the test. However, if we look at another statute it seems that it is also going to be a less important determinant in tracking decisions. As is decided by the House of Representatives in March 2013, it is not the CITO-test, but primary school advice that will be leading in the tracking decision-making. While the CITO-test used to take place in February, it will take place in May starting in 2015. And before May, primary schools should already have given an advice about secondary school track. Some secondary schools used to set a threshold CITO-score level and when children scored below this level, they were not allowed to enter a certain secondary education track. This is now forbidden, secondary schools cannot refuse students based on their CITO-score anymore.(Tweede Kamer, 2013)

Empirical Strategy

To investigate the importance of non-cognitive skills in tracking decisions and see if there is a difference in gender, the research strategy of this paper consists of two steps. The first step is to investigate whether there is a difference in advice boys and girls get for secondary school track, while they score the same on cognitive tests: like the CITO-test and PRIMA-tests. PRIMA-tests are other cognitive tests that children in the dataset took

each two years and measures their level on math, reading and reading comprehension. How the PRIMA-score is defined, is explained in the next section.

I start with an OLS-regression that looks at the relationship between gender and track advice regardless of cognitive and non-cognitive skills.

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \varepsilon_i \quad (1.0)$$

In the equations y_i is the secondary school track advice for child *i*. As will be explained in more detail in the next section, advice can be defined in two different ways, from now on advice 1 an advice 2. Advice 1 divides all the secondary school tracks on a scale of 0 to 5. Advice 2 is a dummy indicating whether a pupil got HAVO or higher advice or whether he or she got lower than HAVO advice. This classification may be of interest, because HAVO and VWO are the tracks marked as higher than average. G_i is a dummy variable indicating whether the child is a girl or not. X_i is a vector for child-specific control variables. The α_0 term is the intercept. The $\varepsilon_i$term is the error term. When, the coefficient of interest, α_1, does not go to zero, there is indeed a difference between track advice boys and girls get.

To find a relationship between gender and track advice, while controlling for cognitive skills, the following OLS regression is estimated:

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - score)_i + \varepsilon_i \quad (2.0)$$

In the equation above I introduced the term, β_1, as the coefficient of interest. The regression can also be taken with PRIMA-test scores instead of CITO-score as control variable.

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (PRIMA - score)_i + \varepsilon_i \quad (3.0)$$

Interaction over time:

For this research we use datasets with a span over 10 years. To see if there is a difference in the effect between the older datasets and the newer datasets the following equation is estimated:

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - score)_i + \delta Year_i \times G_i + \varepsilon_i \quad (4.0)$$

Variable δ explains the interaction of year with gender. To see in which year the effect is the strongest, equations (2.0) and (2.1) are also estimated for each dataset separable.

Non-cognitive skills:

In the second step I will investigate if the tracking-advice/CITO-score (or PRIMA-score) disparity is due to differences in non-cognitive skills between boys and girls.

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_2 (non - cognitive\ skills)_i + \varepsilon_i \quad (1.1)$$

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - score)_i + \beta_2 (non - cognitive\ skills)_i + \varepsilon_i \quad (2.1)$$

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (PRIMA - score)_i + \beta_2 (non - cognitive\ skills)_i + \varepsilon_i \quad (3.1)$$

And

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - score) + \beta_2 (non - cognitive\ skills) + \delta Year_i \times G_i + \varepsilon_i \quad (4.1)$$

If the difference in advice is driven by a difference in non-cognitive skills I expect that β_1 will go to zero. If not, then we still do not know what accounts for the tests-score/track advice disparity.

Heterogeneity:

There may also be a difference between children with different backgrounds. This study will explore if there is a difference in effect explained above between native Dutch children and immigrant children. This can be of interest because there are differences in the position of men and women between cultures. To see if these differences come forward in this study and to see if I find different results for different cultural groups, the same regressions are used as for the whole group, but the dataset is divided into various cultural groups.

Influence of non-cognitive skills on CITO-score:

What if non-cognitive skills are also of influence on CITO-score? The influence of non-cognitive skills on advice estimated in the previous equations may then be conservative. To estimate the actual effect of non-cognitive skills on secondary school track advice the

residual after regressing CITO-score on non-cognitive skills is used in the next equations.

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - residual) + \varepsilon_i \quad (5.0)$$

$$y_i = \alpha_0 + \alpha_1 G_i + \alpha_2 X_i + \beta_1 (CITO - residual) + \beta_2 (non - cognitive\ skills) + \varepsilon_i \quad (5.1)$$

4. Data

The data used to estimate the equations explained in the previous sections comes from the PRIMA-cohort dataset. PRIMA is a large-scale survey and is collected by ITS and Kohnstamm Institute to record the development of cognitive and social skills in the primary education system.[6] 600 primary schools with approximately 60.000 children are followed from 1994 to 2004 each two years to the end of primary school. So data is recorded from children in grades 2, 4, 6 and 8 (final grade). In total there are six datasets (1994, 1996, 1998, 2000, 2002, 2004), which for this research are pooled. Information is collected from the children, teachers, parents and school board.

The dependent variable of this research is secondary school track advice. As mentioned before, the secondary education system in the Netherlands changed in 1999. The new system consists of more forms of secondary education, so a different scale for track advice was used for the datasets from 2000 onward. In order to pool the data and take tests from the total dataset, the advice variable in all datasets should be converted to the same manageable scale. In the figure below you can see how the advice in the new and the old systems is merged to a scale of 0 to 5.

In table 1, as is indicated with a line, can be seen that another classification in advice is made (in this paper known as “advice 2”). Pupils are merged into two groups; one group consists of the pupils who got a HAVO or higher track advice and the other group consists of the pupils who got a VMBO/HAVO or lower advice.

[6] ITS stands for Instituut voor Toegepaste Sociologie

Tab. 1: How the coding of secondary school track advice in the system 1994-1998 relates to the system 2000-2004 . (Timmermans, Kuyper, & Van der Werf, 2013)

Advice 1	Advice 2	Old coding	New coding
0	1	VSO	PRO
0.5		VSO/IVBO	PRO and VMBO-LWOO
1		IVBO	VMBO-LWOO
1.5		IVBO/VBO	VMBO-BBL
2		VBO	VMBO-BBL/KBL and VMBO-KBL
2.5		VBO/MAVO	VMBO-KBL/GL and VMBO-GL
3		MAVO	VMBO-GL/TL and VMBO-TL
3.5		MAVO/HAVO	VMBO-TL/HAVO
4	2	HAVO	HAVO
4.5		HAVO/VWO	HAVO/VWO
5		VWO	VWO

The main independent variables of this research are gender and the cognitive skills. Gender is a dummy variable with value 0, when a child is a boy and value 1, when the child is a girl. Cognitive skills are not only measured by the CITO-test, of which the composition is explained in the previous section. Children in the dataset also had to take the PRIMA-tests. There are three types of PRIMA-tests: a test for reading, a test for math and a test for reading comprehension. The scale on each type of test is different so outcomes of each of the three tests are standardized to have a mean of zero and a standard deviation of one. After standardization of the outcomes of the three different parts the mean of these parts is taken to calculate the mean PRIMA-score. In the dataset of 1994 and 1996 there is no reading comprehension part, so in these years the mean is taken from the other two components. The PRIMA-tests will also be used in regressions as an independent variable for cognitive skills, however the main focus of this research is of CITO-score as an objective assessment measure.

Variables that are used to measure non-cognitive skills are: school well-being, working-attitude and social behavior. Each child got a value on a scale of 1(lowest) to 5(highest) on these characteristics, the teachers of the children appointed this value.

To account for other influences on the track advice, which may also be correlated with gender, we use control variables (X_i). The control variables used are: socio economic

status, age, weighting factor and year of the dataset. Socio economic status is determined through background and education attained by the parents. The value of socio economic status lies on a scale from 1 to 5. Age of the child is ascertained on the first of January of the year of the dataset. The weighting factor is an indicator for socio economic status and tells us how much financial resources a school gets for a child. The weighting factor lies on a scale from 1.0 to 1.9. Extra budget is appointed to a child when children have parents who are low educated or if their parents are non-Dutch.

In this research a difference is made between natives and immigrants. Children are seen as native Dutch, when both parents are born in the Netherlands. When one or both parents is/are born outside the Netherlands, children are seen as immigrant-children. The variables 'country of birth mother' and 'country of birth father' are used to determine whether a child is native Dutch or an immigrant child.

Missing data is dealt with in different ways. Children for which secondary school track advice, age, CITO-score, PRIMA-score or gender was unknown were dropped from the dataset. If socio economics status or weighting factor was unknown: the unknown value was given the value of 99. Since social economics status and weighting factor are both ordinal variables, a value of 99 indicates a different category. When one of the non-cognitive skills: social behavior, school well-being or working-attitude was unknown, they were given the mean value calculated for that variable. Each category included a dummy, with value 0 if the value was missing and thereby given the mean value and value 1 if the value was non-missing.

When the six datasets are pooled and around 15,000 children dropped because they had missing data on key variables, the dataset consists of 42,064 8th grade children on which the research could be performed. In table 2 the results on the CITO-test are summarized by gender. Remarkable are the scores in 1998 and especially 2000, because in these years girls score higher on the CITO-test than boys. In the other years boys score significantly higher.

Tab. 2: Overview CITO-score per year by gender.

	Total			Girls			Boys		
Year	Obs.	Mean	Std. dev	Obs.	Mean	Std. dev.	Obs.	Mean	Std. dev.
1994	6,344	533.20	10.5	3,262	532.66	10.5	3,082	533.76	10.4
1996	5,710	533.21	10.2	2,855	532.95	10.3	2,855	533.47	10.1
1998	6,483	533.22	10.1	3,250	533.30	10.2	3,233	533.14	10.1
2000	7,602	533.59	10.1	3,742	534.00	10.1	3,860	533.19	101.1
2002	8,104	533.86	9.8	4,048	533.51	9.8	4,056	534.22	9.8
2004	7,803	532.87	10.3	3,849	532.69	10.2	3,954	533.06	10.3
Total	42,046	533.34	10.1	21,006	533.21	10.2	21,040	533.48	10.1

The table below shows the descriptive analyses of the main independent variables and shows that the dataset contains a few more boys than girls. This difference is very small; 21,006 against 21,040. It further shows that boys score higher on the cognitive skills; they have a higher CITO-score and PRIMA-score. Girls on the other hand score higher on the non-cognitive skills; working attitude, social behavior and school well-being. This is consistent with results found in other papers as is explained in the literature review.

Tab. 3: Descriptive statistics of the main variables in the empirical analysis

	Total			Girls			Boys		
	Obs.	Mean	Std. dev.	Obs.	Mean	Std. dev.	Obs.	Mean	Std. dev.
Cognitive Skills									
CITO-score	42,046	533.34	10.15	21,006	533.21	10.16	21,040	533.48	10.13
PRIMA-score	42,046	0.07	0.86	21,006	0.04	0.86	21,040	0.10	0.86
Non-Cognitive Skills									
Working Attitude	42,046	3.38	0.74	21,006	3.54	0.70	21,040	3.22	0.74
Social Behavior	42,046	3.58	0.70	21,006	3.70	0.67	21,040	3.46	0.71
School well-being	42,046	3.90	0.59	21,006	3.97	0.56	21,040	3.83	0.61

In the table below we take a look at how often a certain secondary school track advice is given to boys and girls.

Tab. 4: Overview Secondary school track advice by gender

Secondary school track advice		Gender		
Old level	New level	Boys	Girls	Total
VSO	PRO	91 (60,7%)	59 (39,3%)	150
VSO/IVBO	PRO and VMBO-LWOO	24 (70,6%)	10 (20,4%)	34
IVBO	VMBO-LWOO	1,191 (52%)	1,098 (48%)	2,289
-	VMBO-LWOO/VMBO-BBL	49 (50%)	49 (50%)	98
IVBO/VBO	VMBO-BBL	1,006 (52,1%)	926 (47,9%)	1,932
VBO	VMBO-BBL/KBL and VMBO-KBL	3,499 (51,6%)	3,277 (48,3%)	6,776
VBO/MAVO	VMBO-KBL/GL and VMBO-GL	1,768 (49,2%)	1,828 (50,8%)	3,596
MAVO	VMBO-GL/TL and VMBO-TL	4,122 (48,7%)	4,343 (51,3%)	8,465
MAVO/HAVO	VMBO-TL/HAVO	2,162 (48,5%)	2,295 (51,5%)	4,457
HAVO	HAVO	2,926 (50,4%)	2,885 (49,6%)	5,811
HAVO/VWO	HAVO/VWO	2,265 (49,4%)	2,319 (50,6%)	4,584
VWO	VWO	1,937 (50,3%)	1,917 (49,7%)	3,854
Total		21,040 (50%)	21,006 (50%)	42,046

When we look at the classification I made earlier in the secondary school track advice; the one of HAVO-VWO versus lower than HAVO (advice 2), we do not see obvious differences between boys and girls. 7,121 (33.9%) of the girls against 7,128 (33.88%) of the boys in the dataset gets a secondary school track advice of HAVO or higher. However, when we look at lower track advice given, we do see a difference. 2,361 (11.2%) of all the boys in the dataset got an advice that was consistent with VMBO-BBL or lower (in the old system lower than VBO) against 2,142 (10.2%) of all the girls. So the differences do not seem to be in the top of the tracks of the system, but in the bottom. However, these are numbers about the difference in secondary school track advice, without any controls, which say nothing about the intelligence difference between boys and girls.

5. Main estimation results

This section will present the main results from the OLS-regressions as defined by equation (1.0), (2.0), (3.0), (4.0), (5.0) and (1.1) (2.1), (3.1), (4.1), (5.1).

Gender

First we take a look at the effect of gender on secondary school track advice regardless of cognitive skills following equation (1.0) and (1.1). Table 5 informs us about this. Column (1-3) uses secondary school track advice on a scale of 0-5 as dependent variable (advice

1). In column (4-6) the dependent variable is a dummy indicating whether the pupil got a secondary school track advice of HAVO or higher versus HAVO/VMBO or lower (advice 2).

Tab. 5: The effect of gender on secondary school track advice

	Advice1: Score 0-5 Secondary school track advice			Advice2: Advice HAVO/ VWO versus VMBO or lower		
	(1)	(2)[7]	(3)	(4)	(5)	(6)
Girl	.016 (.001)	-.158*** (.009)	-.150*** (.009)	-.003 (.004)	-.065*** (.004)	-.061*** (.004)
Non-cognitive skills						
Working Attitude	NO	.565*** (.006)	.604*** (.008)	NO	.199*** (.003)	.216*** (.003)
Social Behavior	NO	NO	-.150*** (.008)	NO	NO	-.053*** (.004)
School Well-being	NO	NO	.119*** (.009)	NO	NO	.031*** (.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	42,046	42,046	42,046	42,046	42,046	42,046

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age_Square, Socio economic Status, Year and Weighting factor are control variables.

It shows that there is no significant effect of gender on secondary school track advice, neither for the 5-point measurement of school advice nor for the binary variable. However it is interesting to see what happens when non-cognitive skills are added to the model. Column (2) and (5) shows that when controlling for working attitude, girls get a significant lower secondary school track advice. The same effect is found when I control for all the non-cognitive skills. This means that when boys and girls score the same on non-cognitive skills, boys get a significant higher secondary school track advice.

[7] Through the entire research, negative results for social behavior are found. This is why in column (2) and (5), only a control for working attitude is applied.

CITO-score

Table 6 shows the main results from equations (2.0) and (2.1), which uses the CITO-score to control for cognitive skills and secondary school track advice as dependent variable.

Tab. 6: The effect of gender on secondary school track advice, controlling for CITO-score

	Advice1:Score 0-5 Secondary school track advice			Advice2: Advice HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.054***	0.005	.007	.009***	-.012***	-.011***
	(.005)	(.006)	(.006)	(.003)	(.003)	(.003)
CITO-Score	.093***	.088***	.088***	.031***	.029***	.029***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Non-Cognitive Skills						
Working Attitude	NO	.154*** (.004)	.166*** (.005)	NO	.066*** (.003)	.0742*** (.003)
Social Behavior	NO	NO	-.047*** (.005)	NO	NO	-.020*** (.003)
School Well-being	NO	NO	.044*** (.005)	NO	NO	.007** (.003)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	42,046	42,046	42,046	42,046	42,046	42,046

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age_Square, Socio economic Status, Year and Weighting factor are control variables.

The table above shows that CITO-score has a significant effect on track advice. This makes sense because CITO-score is an indicator for cognitive skills. A positive relation can be expected between cognitive skills and secondary school track advice. With respect to equation (2.0), when looking at column (1-3), table 6 further shows a positive effect for gender was found. Columns (1) and (4) show that girls are more likely to get a higher secondary school track advice (of more than 5%) even when the differences in CITO-score are taken into account. This means that when boys and girls score the same on the CITO-

test, girls do get a significant higher secondary school track advice. Also when looking at column (4-6), the chance that a girl gets a HAVO or VWO advice is significantly higher (0,9%) than for boys while scoring the same on the CITO-test. Remarkably when equation (2.1) comes into mind and we control for working attitude, this result is no longer significant positive in both cases, as can be seen in respectively column (2) and (5). When we control for all the non-cognitive skills; working-attitudes, social behavior and school well-being, we also no longer find a significant positive result for gender on advice as can be seen in column (3) and (6). This can be interpreted that gender is of no significant influence on secondary school track advice, if we control for both cognitive (through CITO-score) and non-cognitive skills. Looking at advice 2, even a negative significant result emerges, this means that when I control for non-cognitive skills and cognitive skills, we see that boys are more likely to follow HAVO or VWO.

PRIMA-score

Table 7 shows the main results from equations (3.0) and (3.1), which uses the PRIMA-score as controlling variable for cognitive skills. The table has the same design and can be read in the same way as the table with CITO-score as controlling variable.

Again we find, as expected, a very strong relationship between cognitive skills, which is measured with the PRIMA-score, and secondary school track advice. So again cognitive tests have a positive effect on secondary school track advice. Girls get on average a 9% higher advice than boys, while controlling for PRIMA-score, which can be seen in column (1).

However, in contrast to the outcomes with CITO-score, looking at advice 1, when we control for non-cognitive skills the effect does indeed becomes smaller, but still stays significant at a 5% level as shown in column (3). When we look at advice 2, with the dummy variable as dependent variable, we do see that the effect disappears when controlling for non-cognitive skills. This means that there is no significant difference in getting a HAVO or higher advice for boys and girls, while controlling for non-cognitive skills and PRIMA-score.

Tab. 7: The effect of gender on secondary school track advice, controlling for PRIMA-score

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: Advice HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.088***	.013**	.016**	.022***	-.005	-.004
	(.007)	(.007)	(.007)	(.003)	(.003)	(.003)
PRIMA-score[8]	.999***	.927**	.923***	.348***	.322***	.321***
	(.004)	(.004)	(.004)	(.002)	(.002)	(.002)
Non-cognitive skills						
Working Attitude	NO	.227*** (.005)	.244*** (.006)	NO	.082*** (.003)	.091*** (.003)
Social Behavior	NO	NO	-.066*** (.006)	NO	NO	-.024*** (.003)
School Well-being	NO	NO	.057*** (.006)	NO	NO	.001*** (.003)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	42,046	42,046	42,046	42,046	42,046	42,046

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Year and Weighting factor are control variables.

Heterogeneity:

In this research I also look at specific groups, a difference is made between native Dutch children and immigrant children. Table 8 below shows us the results for equation (2.0) and (2.1) for native Dutch children. Children are considered as native Dutch when both parents are born in the Netherlands. The results on PRIMA-tests can be found in the appendix and are consistent with the results found for CITO-score.

[8] Recall that PRIMA-scores are standardized and lie on a scale between 0 and 1. CITO-scores are not standardized and lie on a scale between 501 and 550. This explains the high value for PRIMA-scores on secondary school track advice compared to CITO-score.

Tab. 8: The effect of gender on secondary school track advice among native Dutch children, controlling for CITO-score

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: Advice HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.058***	0.004	.005	.010**	-.015***	-.014***
	(.007)	(.007)	(.007)	(.004)	(.004)	(.004)
CITO-score	.094***	(.089)***	.088***	.033***	.031***	(.031)***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Non-cognitive skills						
Working Attitude	NO	.160*** (.005)	.172*** (.006)	NO	.074*** (.003)	.082*** (.004)
Social Behavior	NO	NO	-.053*** (.006)	NO	NO	-.023*** (.004)
School Well-being	NO	NO	.052*** (.006)	NO	NO	.013*** (.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	28,273	28,273	28,273	28,273	28,273	28,273

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status and Year are control variables.

Again we see a strong effect, of 0.058, of gender on the dependent variable track advice on a scale of 0-5, while controlling for CITO-score. A significant result at the 5% level is found for advice 2. And again when controlling for the non-cognitive skills, the positive effect of being a girl disappears. Looking at advice 1, there is no significant effect of gender on secondary school track advice, while controlling for cognitive and non-cognitive skills. By advice 2 the effect even reverses. Controlling for cognitive and non-cognitive skills, being a girl has a negative effect of getting a HAVO or VWO track advice.

In table 9 we look at another group, the immigrant children. As explained before, children belong to this group when one or both of the parents is/are born in a foreign country.

Tab. 9: The effect of gender on secondary school track advice among immigrant children, controlling for CITO-score

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: Advice HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.034***	-.007	-.005	-.001	-.014**	-.013**
	(.011)	(.011)	(.011)	(.006)	(.006)	(.006)
CITO-score	.092***	.088***	.088***	.025***	.024***	.024***
	(.001)	(.001)	(.001)	(.000)	(.000)	(.000)
Non-cognitive skills						
Working Attitude	NO	.147***	.157***	NO	.044***	.051***
		(.008)	(.009)		(.004)	(.005)
Social Behavior	NO	NO	-.037***	NO	NO	-.010**
			(.009)			(.005)
School Well-being	NO	NO	.038***	NO	NO	-.002
			(.010)			(.006)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	11,529	11,529	11,529	11,529	11,529	11,529

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status and Year are control variables.

Controlling for cognitive skills, we again see a significant result of 0.339 for being a girl on track advice, when the track advice is on a scale of 0-5. This effect disappears when controlling for non-cognitive skills. This is in line with the results found for all the children in the dataset and with the result found for native Dutch children. However, when looking at advice 2 we do not find a positive result. Controlling for non-cognitive skills even gives a negative significant result at the 5% level. Therefore the effect that girls get a higher secondary school track advice, because they score higher on non-cognitive skills, seems to be stronger for native Dutch children.

The immigrant-children can be divided into more sub-groups. The following table shows the results from equation (2.0) for six sub-groups, including native Dutch.

Tab. 10: The effect of gender on secondary school track advice among different sub-groups, controlling for CITO-score

	Advice 1: Secondary school track advice of sub-groups					
	Dutch	Moroccan	Surinam	Antillean	Turkish	Moluccan
Girl	.0578***	0.054**	0.015	.017	.068***	.106
	(0.007)	(.022)	(.033)	(.059)	(.020)	(.074)
CITO-score	.094***	.092***	.088***	.084***	.033***	.092***
	(0.00)	(.001)	(.002)	(.000)	(.000)	(.004)
Observations	28,273	2,825	1,262	373	3,222	153

Notes: Estimates are coefficients from OLS regressions. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status and Year are control variables.

A significant positive result at the 1% level can be found for native Dutch children and for children with a Turkish background. A significant positive result at the 5% level can be found for Moroccan children. The estimates of coefficients from equation (2.0) is the biggest for Moluccan children, however because there are only few observations in that group, the standard error is quite high which causes this result to be not significant. Below the estimates from equation (2.1) can be seen, in which there is controlled for non-cognitive skills.

Table 11: The effect of gender on secondary school track advice among subgroups, controlling for CITO-score and non-cognitive skills

	Advice 1: Secondary school track advice of sub-groups					
	Dutch	Moroccan	Surinam	Antillean	Turkish	Moluccan
Girl	.005	.021	-.036	.002	.028	.100
	(.007)	(.022)	(.033)	(.061)	(.020)	(.077)
CITO-score	.088***	.092***	.084***	.034***	.087***	.089***
	(.000)	(.001)	(.002)	(.003)	(.001)	(.005)
Non-cognitive skills control	YES	YES	YES	YES	YES	YES
Observations	28,273	2,825	1,262	373	3,222	153

Notes: Estimates are coefficients from OLS regressions. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Year and the non-cognitive skills: Working Attitude, Social Behavior and School Well-being are control variables.

Effect over time:

This section investigates if the effect of girls getting a higher secondary school track advice increases, diminishes or stays the same over time. First we look at the results of estimation (2.0) and (2.1) on each year separately instead of the pooled together dataset. This gives us the opportunity to look in which years the effect is strongest and if there is a certain trend across the years. The results can be found in table 12 below.

Table 12: The effect of gender on secondary school track advice per year

	Advice 1: Score 0-5 Secondary School Track Advice											
	1994		1996		1998		2000		2002		2004	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Girls	.082***	.009	.068***	-.000	.042***	-.017	0.012	-.022*	.057***	.019	.058***	.019
	(.139)	(.014)	(.143)	(.014)	(.014)	(.015)	(.013)	(.013)	(.012)	(.012)	(.013)	(.013)
CITO-score	.078***	.070***	.085***	.077***	.087***	.081***	.097***	.094***	.104***	.100***	.101***	.098***
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	.058	(.001)
Non-cognitive skills control	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES
Observations	6,344	6,344	5,710	5,710	6,483	6,483	7,602	7,602	8,104	8,104	7,803	7,803

Notes: Estimates are coefficients from OLS regressions. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Year, Weighting Factor are standard control variables.

In almost every year girls get a higher secondary school track advice than boys, while controlling for CITO-score. When controlling for non-cognitive skills, the effect disappears, in line with the results found when the datasets were pooled. The exception year is 2000. In 2000 girls did not get a significant higher secondary school track advice. In table 2 can be found that in 2000 girls scored higher on the CITO-test, which may be part of the explanation. The difference between the coefficient with no controls for non-cognitive skills and with controls for non-cognitive skills is the smallest in 2000 as can be seen in column (7) and (8). This implies that the influence of non-cognitive skills is the smallest in 2000. In figure 2 in the appendix the results of estimation (2.0) and (2.1) for the different years are shown graphically. The effect weakens from 1994 to 2000 and then gets stronger again.

The table below shows the estimation results for equation (4.0) and (4.1). We take 1994 as base year and look how the effect moves each year with respect to 1994.

Table 13: The effect of gender on secondary school track advice, interaction over time

	Advice 1: Score 0-5 Secondary School Track Advice	
	(1)	(2)
Girl*1994	-	-
Girl*1996	-.035*	-.046*
	(.021)	(.020)
Girl*1998	-.063***	-.079***
	(.020)	(.020)
Girl*2000	-.087***	-.0848***
	(.019)	(.019)
Girl*2002	-.055***	-.063***
	(.019)	(.019)
Girl*2004	-0.046**	-.063***
	(.019)	(.019)
Non-cognitive skills control	NO	YES

Notes: 1994 is the base year. Estimates are coefficients from OLS regressions. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Year and Weighting Factor are standard control variables.

In line with table 12 the effect of girls getting a higher advice is the strongest in 1994. After that year we see a decline, the strongest decline comparing to 1994 can be found in 2000. The result is then 8,7 percentage point smaller compared to 1994. From 2000 on the decline becomes smaller again, so the effect in 2002 and 2004 is stronger than in 2000. But comparing to 1994, we see a decline in giving higher advice to girls over time.

When we divide the dataset into two groups and pool 1994, 1996 & 1998 together against 2000, 2002 & 2004, we can look at the interaction effect between the older datasets and the newer datasets. I distinguished between these periods because in 1999 the new Dutch secondary school system started, introducing VMBO. In table 14 the results can be found. Although girls get a significantly higher secondary school track advice, controlling for CITO-score, in each year except for 2000, table 14 shows that the effect found is significantly (0.029) lower in the later years than in the early years of the dataset. The introduction of VMBO may be related to the decline. Parents may have had a strong

opinion of not wanting their children to go to VMBO and could thereby have put some pressure on teachers to give a higher advice then they would have given in the old system.

Table 14: The effect of gender on secondary school track advice interaction 1994-1998 versus 2000-2004

	Advice 1: Score 0-5 Secondary School Track Advice	
	(1)	(2)
Girl	.071***	.022***
	(.008)	(.008)
CITO-score	.093***	.088***
	(.000)	(.000)
Girl*Newer_years	-.029***	-.028***
	(.011)	(.011)
Non-cognitive skills control	NO	YES
Observations	42,046	42,046

Notes: Estimates are coefficients from OLS regressions. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Year, Weighting Factor are standard control variables.

Sensitivity control:

It is important to keep in mind that in the regressions previously taken, the 8th grade teachers determine the values of non-cognitive skills. These are the same teachers who determine the secondary school track advice. It is therefore reasonable to expect correlation between non-cognitive skills and secondary school track advice. If we want an independent measure for non-cognitive skills, we can look at the value of non-cognitive skills given to children in grade 6. This is an independent measure because in 6th grade children have a different teacher, so a different teacher from the one who gives the eventual secondary school track advice. The tables below give the results of equation (2.0) and (2.1). The sensitivity control can also be performed for the equation with PRIMA-score, as can be seen in the appendix.

Table 15: The effect of gender on secondary school track advice, controlling for CITO-score and non-cognitive skills 6th grade

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.038***	0.006	.006	.004	-.010**	-.009**
	(.007)	(.007)	(.007)	(.004)	(.004)	(.004)
CITO-score	.096***	.093***	.093***	.031***	.030***	.030***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Non- cognitive skills						
Working Attitude (6th grade)	NO	.118***	.129***	NO	.051***	.058***
		(.006)	(.006)		(.003)	(.004)
Social Behavior (6th grade)	NO	NO	-.029***	NO	NO	-.017***
			(.006)			(.004)
School Well-being (6th grade)	NO	NO	.025***	NO	NO	.013***
			(.006)			(.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	23,905	23,905	23,905	23,905	23,905	23,905

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Weighting factor and Year are control variables.

There are fewer observations than in the previous tables. Two factors contribute to this: one year less data and a lot of children could not be linked between datasets. I use data of children in 8th grade out of 6 years and we start in 1994. So for the children who were in 8th grade in 1994, I do not have 6th grade information. But the most important reason for the smaller number of observations is that it is difficult to link the children between different datasets. Children were linked through an identification number, however for a lot of children this number was not available. This can happen when children retained grades or when children transferred to a different school. That led to the decrease in observations.

When we look at the results in table 15 we see the same pattern, as is the case for the control for non-cognitive skills in grade 8. Although the effect of girls getting a higher secondary school track advice does seem a little smaller (.038), with the smaller number

of observations, the effect still disappears to almost zero (.006) when controlling for 6th grade non-cognitive skills. Looking at advice 2, girls do not significantly have a higher chance of going to HAVO or VWO, as can be seen in column (4). Controlling for the 6th grade non-cognitive skills gives a negative value of .009. This means that when boys and girls score the same on cognitive and non-cognitive skills boys have more chance of going to a higher form of education. In table 20 in the appendix the results on equations (2.0) and (2.1) can be found for the 23.095 children in the above dataset but still with their 8th grade non-cognitive skills appointed. This gives us the opportunity to compare the difference in the non-cognitive skills given by 6th grade teachers and the 8th grade teachers. The effects found for the 8th grade non-cognitive skills are stronger as can be expected due to the correlation as can be seen in table 20, however the results found for the 6th grade non-cognitive skills are consistent with the results found in table 5. The results are thus robust for the different control variables.

Influence of non-cognitive skills on CITO-score:

If non-cognitive skills have an influence on CITO-score, the influence of non-cognitive skills on secondary school track advice as estimated in the previous analysis may be underestimated. Therefore, in this section a CITO-residual variable, which is estimated as the residual from regressing CITO-score on non-cognitive skills, is used instead of the CITO-score. Table 16 shows the results of equation (5.0) and (5.1).

Tables 16 shows similar results as table 6, which shows the effect of gender on secondary school track advice while controlling for CITO-score. Nevertheless, one big difference is found. In table 6 the effect of being a girl on secondary school track advice, with a control for CITO-score, is estimated at .054. In table 16, while controlling for CITO-residual, a bigger influence of gender, with an estimated value of .166, is found.

Table 16: The effect of gender on secondary school track advice, controlling for CITO-residual

	Advice 1: Score 0-5 Secondary school track advice		
	(1)	(2)	(3)
Girl	.016	0.166***	.007
	(.010)	(.007)	(.006)
CITO-Residual	NO	.089***	.088***
		(.000)	(.000)
Non- cognitive skills control	NO	NO	YES
Observations	42,046	42,046	42,046

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status, Weighting factor and Year are standard control variables.

So the difference in track advice between boys and girls is bigger when controlling for CITO-residual than when controlling for CITO-score. The reason therefore is that non-cognitive skills influence CITO-score. When I control for non-cognitive skills while the influence of non-cognitive skills on CITO-score is removed, the effect of girls getting a higher advice disappears. This analysis thereby shows that the influence of non-cognitive skills on secondary school track advice is bigger than previously estimated. The previous results can be interpreted as lower-bound estimations.

Summing up, the results show us that girls get a higher secondary school track when controlling for the results on cognitive tests like PRIMA and CITO. When controlling for non-cognitive skills this effect diminishes, disappears or even reverses. In the next session I will explain how we can interpret these results.

6. Conclusion and Discussion

This paper investigates the influence of cognitive and non-cognitive skills on secondary school track advice and focuses on the differences between boys and girls. When looking at the results in the previous section we can indeed say that both cognitive and non-cognitive skills have an important role in explaining secondary school track advice. Girls get a higher secondary school advice than boys, when scoring the same on cognitive tests, which can be explained by their higher score on non-cognitive skills. When non-cognitive skills are taken into account, the effect of girls getting a higher advice diminishes or disappears. This effect is stronger for the PRIMA-score than for the CITO-score. This is remarkable since the CITO-test is an incentivized test, which is known as an end-test that is important in determining secondary school track, and the PRIMA-test is not. The effect of non-cognitive skills on secondary school track advice is the strongest for native Dutch children. As expected, cognitive skills are very important in determining secondary school track advice.

This study uses a clear research design and only looks at the transition between primary school and secondary school. It thereby looks at advice given by the primary school, not at the track that a child eventually followed. Future work could focus on completion of secondary school, to see who actually finished which track of secondary school. Out of the scope of this research, a more in-depth discussion on the benefits of non-cognitive skills in further education path and career would be very interesting.

The effect of girls getting a higher secondary school track advice is evident through time although the effect seems a little bit stronger in the earlier years of the dataset. Recall that the latest year used in this dataset is 2004, which is more then 10 years ago. It would be interesting to do research on more recent data, to see if the results found are still significant.

Since boys score worse on non-cognitive skills, they often get a lower secondary school track advice than their scores on cognitive tests would predict. Boys are not achieving up

to their cognitive potential in the current Dutch education system, this can make us think if this system is suitable for boys? It would therefore also be interesting to do further research on the structure of the Dutch education system and for example on the feminization of the education system. Are female teachers less able or less willing to handle boys with challenging behavior? Finding out how we can improve boys' non-cognitive skills would be useful, so boys can get higher secondary school track advice.

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Appendix

Table 17: The effect of gender on secondary school track advice among native Dutch children, controlling for PRIMA-score

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: Advice HAVO/ VWO vs VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.097***	.016**	.019**	.025***	-.007	-.006
	(.008)	(.008)	(.008)	(.004)	(.004)	(.004)
PRIMA-score	.971***	.898***	.892***	.364***	.334***	.332***
	(.005)	(.005)	(.005)	(.003)	(.003)	(.003)
Non-cognitive skills						
Working Attitude	NO	.231*** (.006)	.251*** (.007)	NO	.092*** (.003)	.103*** (.004)
Social Behavior	NO	NO	-.082*** (.007)	NO	NO	-.032*** (.004)
School Well-being	NO	NO	.070*** (.007)	NO	NO	.018*** (.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	28,273	28,273	28,273	28,273	28,273	28,273

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic status and Year are control variables.

Table 18: The effect of gender on secondary school track advice for immigrant children, controlling for PRIMA-score

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: Advice HAVO/ VWO vs VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.068***	.004	.006	.010	-.007	-.007
	(.013)	(.013)	(.013)	(.006)	(.006)	(.006)
PRIMA-score	1.093***	1.021***	1.017***	.319***	.299***	.298***
	(.009)	(.009)	(.009)	(.004)	(.004)	(.004)
Non-cognitive skills						
Working Attitude	NO	.2244***	.235***	NO	.059***	.065***
		(.009)	(.011)		(.005)	(.005)
Social Behavior	NO	NO	-.038***	NO	NO	-.009**
			(.011)			(.005)
School Well-being	NO	NO	.037***	NO	NO	-.003
			(.012)			(.006)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	11,529	11,529	11,529	11,529	11,529	11,529

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Social economic status and Year are control variables.

Figure 2: The effect of gender on secondary school track advice, overview over time

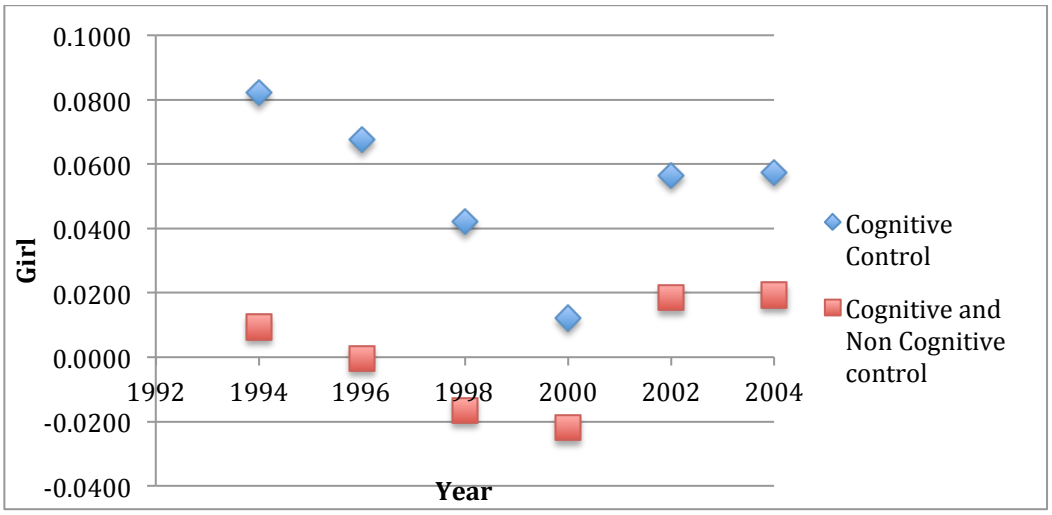

Table 19: The effect of gender on secondary school track advice, controlling for PRIMA-score and non-cognitive skills 6th grade

	Advice 1: Secondary school track advice			Advice 2: HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.068***	.018**	.019**	.015***	-.010**	-.002
	(.008)	(.009)	(.009)	(.005)	(.004)	(.005)
PRIMA-score	1.04***	.991***	.988***	.358***	.340***	.339***
	(.006)	(.006)	(.006)	(.003)	(.003)	(.003)
Working Attitude (6th grade)	NO	.179***	.196***	NO	.064***	.073***
		(.006)	(.007)		(.003)	(.004)
Social Behavior (6th grade)	NO	NO	-.045***	NO	NO	-.021***
			(.007)			(.004)
School Well-being (6th grade)	NO	NO	.033***	NO	NO	.013***
			(.007)			(.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	23,905	23,905	23,905	23,905	23,905	23,905

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic Status, Weighting factor and Year are control variables.

Table 20: The effect of gender on secondary school track advice, controlling for CITO-score and non-cognitive skills 8th grade

	Advice 1: Score 0-5 Secondary school track advice			Advice 2: HAVO/ VWO versus VMBO or lower		
	(1)	(2)	(3)	(4)	(5)	(6)
Girl	.038***	-.008	-.007	.004	-.016***	-.015***
	(.007)	(.007)	(.007)	(.004)	(.005)	(.005)
CITO-score	.096***	.092***	.091***	.031***	.030***	.029***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Non-cognitive skills						
Working Attitude (8th grade)	NO	.118***	.147***	NO	.059***	.067***
		(.005)	(.006)		(.003)	(.004)
Social Behavior (8th grade)	NO	NO	-.038***	NO	NO	-.018***
			(.006)			(.004)
School Well-being (8th grade)	NO	NO	.038***	NO	NO	.005
			(.007)			(.004)
Controls						
Age	YES	YES	YES	YES	YES	YES
Age Square	YES	YES	YES	YES	YES	YES
Socio economic status	YES	YES	YES	YES	YES	YES
Weighting factor	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
Observations	23,905	23,905	23,905	23,905	23,905	23,905

Notes: Estimates are coefficients from OLS regressions. Secondary school track advice is the dependent variable. The dependent variable in column 1-3 is advice on a scale of 0-5. The dependent variable in column 4-6 is HAVO/VWO advice versus VMBO or lower. Standard errors are in parentheses. *: significant at 10%. **: significant at 5%. ***: significant at 1%. Age, Age-Square, Socio economic Status, Weighting factor and Year are control variables.