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Lex Borghans  
Bart H.H. Golsteyn  
Anders Stenberg

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**Lex Borghans**

*ROA, Maastricht University  
and IZA*

**Bart H.H. Golsteyn**

*ROA, Maastricht University,  
SOFI, Stockholm University and IZA*

**Anders Stenberg**

*SOFI, Stockholm University*

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IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
E-mail: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### **Does Expert Advice Improve Educational Choice?**<sup>\*</sup>

This paper reports evidence that an individual meeting with a study counselor at high school significantly improves the quality of choice of tertiary educational field, as self-assessed 18 months after graduation from college. The results are strongest among males and those with low educated parents. To address endogeneity, we explore the variation in study counseling practices between schools. Tentative analyses also indicate that counselors reduce students' uncertainty about their own individual preferences at least to the same extent as uncertainty about objective measures such as employment prospects.

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Corresponding author:

Bart H.H. Golsteyn  
Maastricht University  
P.O. Box 616  
6200 MD, Maastricht  
The Netherlands  
E-mail: [b.golsteyn@maastrichtuniversity.nl](mailto:b.golsteyn@maastrichtuniversity.nl)

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## **1. Introduction**

The choice of a field of study at college is typically surrounded with uncertainty about the returns to education, the characteristics of occupations one can work in after graduating and the match between the individual preferences and job characteristics. A reduction in this uncertainty may provide substantial efficiency gains as an improved educational choice could enhance individuals' job satisfaction, overall productivity and decrease study time devoted to correct initial choices. In this perspective, interesting empirical questions are if and how policy can reduce uncertainty and improve the quality of educational choices. In most OECD countries, schools employ study counselors to address this task. However, while a number of recent articles have reported that information influences educational choice, little is known if, how and to what extent study counseling may affect educational choices. To the best of our knowledge, this study is the first to link study counseling to the quality of educational choice assessed after education has been completed and individuals have entered the labor market.

The aim of this paper is to analyze if study counseling at secondary school influences the quality of tertiary level educational choice. We use rich survey data of Dutch tertiary education graduates which include retrospective information on the use of counseling at secondary school, the name of the secondary school they graduated from, their family background, personality traits – risk-preferences, cognitive abilities, locus of control, anxiety, self-perception and self-confidence – and an assessment of the quality of their educational choice. Our main sample consists of 4,191 graduates who 18 months after tertiary school completion are asked whether they would choose the same educational field if they had a chance to choose again.<sup>1</sup> Around 22%

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<sup>1</sup> The educational system in the Netherlands is such that most individuals complete a tertiary education. According to Statistics Netherlands, around 15% end up with a diploma lower than

of the graduates state they would have rather studied a different field of education. The relevance of this indicator is supported by its link with a higher probability of re-enrollment in education, which in turn leads to substantial efficiency losses (Borghans and Golsteyn 2007).<sup>2</sup>

Theoretically, we view students' predictions of their future utility of an educational choice as noisy, such that their expected utilities partly deviate from the true future utilities associated with different educational paths. The uncertainty may regard the conditions on the labor market, the job-specific environments and the individual's own utility function, e.g. an imprecise knowledge about own competences, motivations and/or preferences. Study counseling may reduce uncertainty in one or several respects, and thereby reduce the noise around the true values. The empirical question we raise is whether data supports that an individual meeting with a counselor improves the self-assessed quality of educational choice.

A methodological challenge of our analyses is that the decision to seek help from a counselor is endogenous. Individuals who, for instance, are more uncertain (or intelligent) may seek more help from counselors and make poorer (better) choices so that conventional OLS estimates of the effect of study counseling on quality of educational choice are underestimated (overestimated). To circumvent this endogeneity problem, we explore the variation in counseling practices between schools in an instrumental variable (IV) setting. Specifically, we define our IV as the fraction of students from the same secondary school (excluding the individual him/herself) who state that they had a personal meeting with a study counselor. The variation in this variable is partly exogenous as it reflects individual counselors' heterogeneous behaviors, which are unrelated to individual or school level characteristics.

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tertiary level (<http://statline.cbs.nl/statweb/>). As a comparison, this exceeds the high school completion rate in the US, which peaked at around 80% in the 1970s (Murnane 2013, p382).

<sup>2</sup> Table A1 in Appendix 2 reveals – using a different data set – that the percentage preferring a different field in the Netherlands is relatively low compared with other countries.

We consider the main threat to our identification strategy to be that some unobserved school specific confounders make our IV regressions overestimate the effects of counseling. For example, if better schools generally provide more counseling, and better school environments induce a higher quality of educational choice, the effect of counseling on quality of educational choice will be overestimated. Therefore, we fully acknowledge the need to investigate if school level unobservable factors confound our IV-estimates. We perform a number of robustness checks which overall indicate little support for such “school endogeneity”. First, counseling incidence is *not* explained by the recorded school averages of parental education, school averages of immigrant status, school averages of IQ, anxiety and the other personality traits in our data set. In fact, the averages of these variables are poor predictors of counseling incidence. Second, our IV estimates remain virtually unchanged as explanatory covariates are added (the coefficient changes from -.0226 to -.0219). Third, if school endogeneity were an issue, we would expect other school specific measures of guidance policies, some of which are highly correlated with counseling incidence, to be biased by the same factors. However, using different measures of career guidance yields no significant IV estimate. In addition, while a baseline OLS model coefficient of counseling on the quality of educational choice may be biased both by individual and school endogeneity, controlling for school specific factors by adding school fixed effects has little influence on the parameter estimate. Overall, detailed checks (Section 3.2 and Section 5) yield results which are consistent with the key assumptions of our model with respect to school endogeneity, individual endogeneity, peer-effects and data measurement errors.<sup>3</sup>

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<sup>3</sup> Two features which should decrease the risk that the IV reflects peer effects are that our data is based on Internet surveys and include relatively few pupils per school. Also, as a robustness check, we redefine our IV, excluding students from the same school who graduated in the same year as the respondent, without affecting our results.

Uncertainty is a classical topic in economics (e.g. Levhari and Weiss 1974, Olson et al. 1979, Kodde 1986, Manski 2004) which has developed into several branches. We wish to highlight four categories of empirical findings which are related to our study, supporting that counseling may play an important role. The first group of studies seeks to map the determinants and the extent of uncertainty about educational choice (Dominitz and Manski 1996, Betts 1996, Kauffman 2009, Arcidiacono et al. 2012), finding that students' knowledge about the labor market is associated with family background factors and that senior students have more accurate knowledge, implying a learning process during college years.<sup>4</sup> The second, third and fourth category of studies have focused on different parts of "the anatomy" of the uncertainty. The second group consists of a large number of studies, mainly recent, which have reported that educational choices (the choice of college major or college enrollment), educational aspirations and/or attendance rates are affected by information on objective measures, such as the expected returns to education, about own ability, about the availability of financial aid, or assistance in filling out paper work (Befy et al. 2012, Bettinger et al. 2012, Dinkelman and Martines 2011, Høst et al. 2012, Jensen 2010, Nguyen 2008, Oreopoulos and Dunn 2013, Papay et al. 2011, Stinebrickner and Stinebrickner 2011, 2012, Zafar 2011). The third group reports that highly subjective factors may also generate uncertainty if students need to disentangle their own preferences/utility from the expectations of parents, peers, gender roles and/or other ideas about own identity (Akerlof and Kranton 2000, 2002, Favara 2011, Humlum et al. 2012). The fourth group of studies is developed by psychologists independently of the economics literature, and shows that study counseling affects "self-efficacy", which measures short term change in

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<sup>4</sup> As sources of information, Betts (1996, p48) reported that students primarily used newspapers and magazines (60-70%), whereas career service centers were less common (30-40%) until in the final year of college.

certainty about own ability and future preferences regarding individual career choice (e.g. Bandura 1977, Whinston et al. 1998, Kraus and Hughey 1999, Jurgens 2000). In relation to these branches of the literature on educational choice, we see the incidence of counseling as a generic measure which may encompass information on objective measures (e.g. earnings) and/or address subjective issues related to uncertainty about own utility function (identity/self-efficacy). Our main analyses are agnostic on the exact mechanisms, or the anatomy of the uncertainty which counselors are concerned with, but we appraise this issue via additional survey data of Dutch counselors which cover 112 of the 567 schools included in our sample.

We are aware of three articles which have evaluated study counseling practices, potentially addressing both subjective and objective factors, but also dependent on the quality of the individual counselors. As outcomes, they all consider transitions from high school to college, but results have been mixed. Cunha and Miller (2009) exploit the staggered roll-out of the Texas GO Center Project which targeted academically prepared students with counseling and guidance by student peers. They find college attendance rates to increase among Hispanic and low income students. Avery (2010) analyzes the impact of ten hours of individualized meetings with a professional college counselor, randomly assigned to high achieving students from relatively poor families, finding no effect on college applications but a small (statistically insignificant) effect on the quality of college chosen. Carrell and Sacerdote (2013) randomly assign college mentoring services and fee waivers for college applications to high school senior students, finding a significant impact on women's decisions to enroll in college, but no significant effects for males or when cash bonuses were offered without mentoring.

This paper adds to the existing literature by providing an evaluation of a widely existing policy tool, study counselors at high school, and by assessing outcomes 6-7 years after a meeting

took place. We primarily address the question: does counseling influence individuals' quality of educational choice?<sup>5</sup> The assessments of educational choice are made 18 months after graduation, and thereby include individuals' full experience of their educational choice, and their initial experience of actual (rather than expected) labor market careers. The assessment also takes into account that individuals may attach different weights to a wide array of outcomes, including non-monetary aspects, wages and job-opportunities (Befy et al. 2012). The main finding is that counseling has a statistically significant impact on the quality of educational choice. In terms of magnitude, one standard deviation more counseling at a school is associated with a 9 percent decrease in the probability of students preferring a different field of education in retrospect. Tentatively, based on the survey data of Dutch study counselors, we also find indications that counseling addresses uncertainty about own preferences at least as much as information about objective measures such as employment prospects. The positive effects of study counseling are strongest for males and for those whose parents have low levels of education. Overall, we consider the estimates to be large, especially since counseling is relatively inexpensive and because a low quality educational choice may be associated with substantial costs for the individual and from society's point of view.

The plan of the paper is as follows. Section 2 describes the Dutch schooling system, the data set and our key variables, counseling and the quality of the educational choice. In Section 3, the empirical strategy is presented while Section 4 contains our main results and Section 5 the robustness analyses. Section 6 discusses the mechanisms. Section 7 concludes.

## **2. Dutch schooling system, data and sample**

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<sup>5</sup> Using Dutch data, there is limited scope to analyze college choice as students almost always enter tertiary education with majors within their respective educational tracks (see Section 2).

In this section, we give an account of the Dutch schooling system, the sources of our data and define the sample of interest. We then present some descriptive statistics and discuss in detail the definitions and the properties of our key measures: study counseling and the quality of educational choice.

### *2.1 The Dutch schooling system*

The Dutch schooling system involves that at age 13, students are tracked into three different levels of secondary school. At the end of secondary school (age 16, 17 or 18), a choice has to be made regarding the field of specialization in tertiary education. A specific feature is that almost all students enroll in some form of education classified as tertiary and that only a negligible number of students starts working after secondary education (see footnote 1). The choice of field of specialization in tertiary education is important in the Dutch system since the disciplines are very specific (for instance, econometrics and economics are two separate tracks) and it is difficult to change from one specialization to another.<sup>6</sup> The lowest level track at tertiary level is MBO which basically consists of learning a trade one started learning at secondary level (typical professions of graduates from this level are e.g. baker, secretary, assistant to a dentist). The next level, HBO, is also vocational but at a higher level and leads to a degree comparable to a bachelor degree (e.g. elementary and secondary school teachers, nurses, accountants, pedagogues, journalists). The highest level is university. Figure A1 in the appendix 1 provides an overview of the Dutch educational system and explains the abbreviations used for the different

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<sup>6</sup> Students in the Netherlands are divided in three tracks when they are twelve years old. This may attenuate the importance of counselling as the tracking could limit the possibilities for counsellors to influence the quality of students' choices.

degrees. To simplify, we will refer to these tertiary levels as low, middle and high level educational tracks.

## 2.2 *Data sources*

We use data from a sample of Dutch graduates. Each year, the Research Centre for Education and the Labour Market (ROA) gathers information from Dutch graduates (*Schoolverlater Informatie Systeem*, abbreviated to SIS). The primary purpose of the survey is to give representative overviews of the graduates' position on the labor market and their assessments of the quality of the education they completed.

We use information from the 2004 wave of the data. In this wave, all graduates from all levels in the Dutch educational system received a questionnaire 1.5 years after graduation. The response rate was 45 percent. Half a year after the survey took place, we approached the respondents with an additional Internet questionnaire which contains important variables for our analyses. In order to stimulate participation and deliberate answers, we offered, upon completion of the questionnaire, a personal profile about their style to deal with choices. The survey included detailed questions on individual personality traits, such as indicators of individual discount rates, risk-preferences, cognitive ability, locus of control, anxiety, self-perception and self-confidence.

An important feature of the data set is that respondents are also asked in which secondary school they studied and in which year they graduated from this school. We use this information

to construct an instrument for school counseling and measures of school averages of various characteristics.<sup>7</sup>

Our sample of interest consists of individuals aged 20 to 30, in total, 4,191 graduates from 567 secondary schools.<sup>8</sup>

### 2.3 *Measuring study counseling*

To assess the occurrence of counseling, respondents were asked to consider the information they acquired in secondary school to prepare for the choice of field of tertiary education. Table 1 contains summary statistics of the respondents' answers to the statement "I had personal conversations with the study counselor". There are five answer categories to this statement: never (30 percent), sometimes (47 percent), regularly (16 percent), often (7 percent), very often (1 percent). Thus, about one third of the students state that they had no contact with a study counselor. The frequencies of the different answer categories appear similar for men and women, for natives and immigrants, and for those with higher and lower educated parents. In contrast,

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<sup>7</sup> Personality traits are measured after counselling took place. If personality traits are unstable, the relationships with counselling may therefore be subject to reverse causality. Borghans et al. (2008) review the evidence on the stability of IQ and personality traits. Roberts and DelVecchio (2000) show that the rank-order trait consistency in the age group 18-22 is around 50%. The full list of the questions we used to measure personality is provided in appendix 3.

<sup>8</sup> It is difficult to establish with certainty how data attrition affects estimates since, with an IV strategy, it is never possible to pin-down in detail the validity of a Local Average Treatment Effect. Nevertheless, the main impression from the attrition (see table A2 in the appendix) is that the remaining observations in the second wave are similar to the first wave respondents in terms of their quality of educational choice, but constitute lower fractions of men and low level (MBO) graduates. In general, attrition makes us overestimate the impact of counseling if students who are unaffected by counseling are underrepresented. One might suspect individuals from higher socioeconomic background to be better informed (Betts 1996, Kauffman 2009) and have lower marginal gains from additional information. The attrition, if anything, indicates these groups are overrepresented. The final sample contains observations from all important subgroups, but estimated results are also reported for these groups separately in Section 4.

those in the lowest secondary track are more likely to reply that they never had a personal meeting with a study counselor.<sup>9</sup>

-- TABLE 1 --

We construct a dummy variable which has the value 0 if a student never was in personal contact with a study counselor and 1 otherwise. Thus, we pool the answer categories “sometimes”, “regularly”, “often” and “very often” as there may be variation in how respondents perceive these categories. Table A3 in the appendix shows descriptive average characteristics of individuals separated by gender and the incidence of seeing a counselor. Counseling is only associated with minor systematic differences in these variables, except that females with a higher IQ and students at the middle or high level tracks of secondary school are more likely to meet the counselor. It may be that students in these tracks better understand the importance of gathering information and/or that counseling is offered more often as the studies are less specific and the connection to occupations is less obvious. This could make it more difficult for the students to understand the consequences of choosing a discipline.

The indicator variable of individual counseling is the basis for the construction of our instrumental variable. For each individual, the IV is defined as the average counseling among students from the same secondary school, excluding the individual him/herself.<sup>10</sup> We assume that this variable reflects study counseling practices at secondary schools and that the variation

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<sup>9</sup> The separation between low and high education of the parents is based on the distribution of the level of education among parents. Low level indicates a level lower than the median and high level a level higher than the median level of education.

<sup>10</sup> With our strategy we also avoid potential problems related to the possibility that the answers of students on questions about the quality of educational choice are correlated with the questions about counselling earlier on in the survey due to mood or personality of that student.

contains an exogenous element. The credibility of this assumption is discussed in Section 3 where we describe the empirical method and in Section 5 where we provide various robustness checks. The IV thus requires that each school in the sample should be represented by at least 2 respondents. Figure 1 shows the distribution of the number of students in our sample who graduated from the same school. The median is 10, the first quartile is 5 and the third quartile is 15. Figure 2 shows the average counseling frequency across the schools. Around 11% of the respondents were in a school in which every student in our sample met a counselor, while 2% of the respondents were in a school in which no respondent in our sample met a counselor. The other respondents were in schools with an average counseling between these extremes. Of the overall variance in this variable, three fourths stem from between school variation and one fourth from within school variation.<sup>11</sup> The observed variation in Figure 2 may not only show that individual counselors behave differently, but may also reflect a combination of school factors, students sorting into schools and randomness. The major part of this article will seek to identify and isolate the variation which is unrelated to school and student characteristics to estimate the causal effect of counseling on quality of educational choice.

--FIGURE 1--

--FIGURE 2--

#### 2.4 *Measuring quality of educational choice*

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<sup>11</sup> The within school variation may be seen as measurement error in school counselling policies, which is correlated with the number of observations we have per school. This generates heteroscedasticity in our first stage predictions which we address by allowing for a more flexible functional form, discussed in Section 5 (see Table 8).

The quality of the educational choice may be defined using a large number of criteria, to which different individuals attach different weights, e.g. the amount of leisure or commuting time, the provision of child care facilities by the employer, etc. This makes it appropriate to let the individuals themselves assess the quality of the educational choice. Our measure is an assessment 18 months after graduation, so individuals have by then attended and completed the particular educational track they chose and have had an additional 18 months to learn more about the consequences of their choice.

The question we use to assess the quality of educational choice reads “Would you in retrospect choose the same education as the one you followed again?”. Answer categories are 1. “yes, same education at same college,” 2. “yes, same education but at a different school,” 3. “no, a different education,” 4. “no, I would not go and study.” We construct a dummy variable which has the value 0 if the answer was 1 or 2, and 1 if the answer was 3 or 4 (the number of graduates answering they would not go and study is negligible). The idea behind our indicator is that a person made an adequate choice if the decision based on limited information at secondary school is the same as the one stated 18 months after graduation, when consequences of the decision are known. Therefore, our outcome variable of interest can be seen as an indicator variable of low quality of the educational choice. Table 2 reveals that approximately 22% of the graduates would have chosen a different field of education, and that this is roughly equal between men and women and among people from different secondary educational tracks. Immigrants’ choices appear more often to be of low quality than natives’ choices, as is the case for students whose parents have low education compared to those with highly educated parents.

-- TABLE 2 --

### 3. Empirical Strategy

#### 3.1 Empirical model

To empirically investigate whether the quality of educational choice ( $Q_{it+1}$ ) may be explained by, an indicator variable for receiving counseling ( $C_{it}$ ), we need to take into consideration that counseling is a non-random event which potentially depends on the characteristics of the individual as well as of the school. In an OLS regression framework, this is addressed by controlling for individual characteristics  $X_i$  which include gender, age, secondary educational track attended, parental education, immigrant background, economic preference parameters (time and risk preference) and indicators of personality traits (locus of control, anxiety, self-perception, self-confidence, and cognitive ability), and a vector of school characteristics  $X_j$ , containing “school pupil averages” of the same variables, where  $j$  denotes all individuals  $j \neq i$  who attended the same secondary school as individual  $i$  except for individual  $i$  him/herself.<sup>12</sup>

$$(1) Q_{it+1} = b_0 + b_1 X_i + b_2 X_j + b_3 C_{it} + e_i,$$

Now, as the incidence of seeing a counselor is likely to be endogenous, the error term may consist of unobserved individual characteristics  $Z_i$  and school specific factors  $f_s$ .

$$e_i = b_4 Z_i + b_5 f_s + \varepsilon_i$$

If  $f_s$  or  $Z_i$  are correlated with  $C_{it}$ , the parameter  $b_3$  will be a biased estimator of the impact of counseling on the quality of educational choice. Table 3 shows results from the baseline OLS regression, indicating a beneficial but small impact of study counseling on the quality of the educational choice. The coefficient, corresponding to a one percent decrease in low quality educational choices, is potentially biased due to individual characteristics  $Z_i$ , school specific

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<sup>12</sup> Time  $t$  should not be read as calendar year, it is merely to indicate prior to the assessment of educational choice.

factors  $f_s$ , or both. The school endogeneity implies that schools' provision of counseling is correlated with their pupils' abilities to gather information. Thus, even if counseling has no effect on individuals' choices, there may be a spurious correlation between counseling and quality of educational choice.

--TABLE 3--

The individual endogeneity ( $Z_i$ ) may be thought of in terms of uncertainty about future career choice. Students who are more uncertain may be more likely to seek counseling, but may also be more likely to end up with a low quality educational choice (cf. seeing a medical doctor increases the probability of being sick). This would make the OLS coefficient underestimate the impact of counseling.<sup>13</sup>

To address the individual endogeneity, we employ an instrumental variable strategy. The idea originates from a widespread view among professional study counselors that there is considerable heterogeneity in counseling activity between high schools which stems from the individual counselor(s) who may either be very active or offer counseling of such quality that they attract students' visits. To the extent that this variation is uncorrelated with school specific characteristics and/or individual traits of the pupils, it will generate an exogenous variation which may be explored as an instrumental variable (IV) to explain the incidence of seeing a counselor. We employ as IV the average frequency of counseling among students  $j \neq i$  from the same school as the respondent,  $S_{jt}$ , to proxy for the counseling practices at the school.  $S_{jt}$  does not include the individual's own endogenous decision, but is assumed to predict his/her probability

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<sup>13</sup> Of course, it may also be that students who are better at gathering information are more likely to see a counselor, leading to a reverse bias.

of receiving counseling. In a second stage regression, the predicted value ( $\hat{C}_{it}$ ) is used as an explanatory variable for  $Q_{it+1}$ . Formally, the following model is estimated:

$$(2) C_{it} = \alpha_0 + \alpha_1 X_i + \alpha_2 X_j + \alpha_3 S_{jt} + \varepsilon_i$$

$$(3) Q_{it+1} = \beta_0 + \beta_1 X_i + \beta_2 X_j + \beta_3 \hat{C}_{it} + v_i,$$

in which  $\varepsilon_i$  and  $v_i$  are error terms in the respective regressions and the  $\alpha$  and  $\beta$  parameters are to be estimated. The second stage estimate of  $\beta_3$  is the parameter of main interest. It reflects the Local Average Treatment Effect (LATE) and is only valid for those who are affected by an increase in study counseling activity (Imbens and Angrist 1994).<sup>14</sup> In theory, one may expect that the individuals most affected by the counseling activity at the school would be those who tend to have less accurate information at the outset, e.g. with immigrant backgrounds or with parents who have low educational attainments. Uncertainty about the own utility function may strengthen or weaken this tendency, depending on how expectations of parents, peers, gender roles and/or own identity vary across socioeconomic groups and whether they generate certainty

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<sup>14</sup> To obtain the average treatment effect of the whole population, one would require that our IV affects the behavior of all individuals in the same way. In an effort to find out which individual characteristics are associated with our LATE estimates, we estimated  $C_{it} = \lambda_0 + \lambda_1 S_{jt} + \lambda_2 X_{it} + \lambda_3 (S_{jt}) * X_{it}$ . The coefficients in  $\lambda_3$ , of the interaction variables, could then be informative, but none of them are significant. For the subsample of natives, the interaction between our IV and the discount rate is positive and significant, suggesting that sensitivity to counselor's behavior depends on the discount rate. The result holds for the subsample of males but not for females. For immigrants, we find that those with an internal locus of control are affected significantly more than immigrants with an external locus of control. Complete results are available on request.

(e.g. “I want to do what my mother/father does”) or uncertainty (e.g. a conflict between complying with others’ expectations and pursuing a different educational path).<sup>15</sup>

### 3.2 *Validity of our instrumental variable*

The validity of our empirical strategy hinges on that the IV is able to predict that individuals seek help from a counselor but is uncorrelated, or unconfounded, with potential unobservable variables which simultaneously influence the probability of seeing a counselor and the outcome variable  $Q_{it+1}$ . The underlying assumptions of the unconfoundedness condition are not directly testable, but below we address their credibility by discussing measurement issues (3.2.1), school specific confounders (3.2.2), and individual confounders (3.2.3).<sup>16</sup> First stage regressions, presented in Table 4, indicate that students are much more likely to see a study counselor if they attended schools where counseling of other individuals was more frequent. Thus, the first condition of our IV strategy appears to hold ( $F$ -statistic of 40.3), even after including a large number of control variables.

-- TABLE 4 --

#### 3.2.1 *Measurement issues*

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<sup>15</sup> Counsellors could make a difference either by encouraging individuals to challenge these expectations or by strengthening the preferences generated by these expectations.

<sup>16</sup> Angrist and Krueger (2001) emphasize the importance of a well developed theoretical “story”. Moffitt (2004, p6) makes the following remark: “...minimal identifying assumptions must be justified or rationalized on the basis of a priori argument, outside evidence, intuition, theory, or some other means outside the model. While the necessity to make these types of arguments may at first seem dismaying, it can also be argued that they are what social science is all about, which is using one’s comprehensive knowledge of society to formulate theories of how social forces work, to make informed judgments about those theories, and debating with other social scientists what the most supportable assumptions are.”

In this subsection, we consider the accuracy of the collected data on personality traits and whether our IV really captures the counseling activity at the schools. We also give an account of a correction in the standardization of the counseling variable.

Looking at our first stage regression results, a reservation one might have is that except for the IV, the level of educational track and the individual level of anxiety, the covariates generally do not significantly explain the occurrence of counseling. This may indicate that the personality traits are poorly measured. We therefore ran a regression with the level of tracking as the dependent variable, which we would expect to be highly endogenous and correlated with these variables. We find that the covariates are significant and in the expected direction (e.g. the IQ variable is associated with a  $t$ -value of 23.7).

Another concern is that our IV may mismeasure the true counseling activity of the full student population at schools. To examine this issue, we link our data to an additional survey data set from 2008, where study counselors from middle and high level Dutch high schools were approached to fill out a questionnaire about their activities and to what extent students in their schools sought help from the study counselors. Using the school name which was available in both data sets, we merged the information from this counselor data set with our sample (1168 students from 134 schools). The data indicate that our IV indeed does pick up school study counseling practices. In Table 5, answers are shown for counselors from schools where our IV is above and below median respectively. The survey answers of the counselors in schools with above median IV, compared with below median, indicate (1) that there were more counselors active, (2) that the percentage of the students seeking individual study counseling was higher and (3) that counselors more often stated there was enough information available in the school to prepare students for their choice. These differences are significant at the 1 percent level.

--TABLE 5 --

Given that our IV captures the behavior of the individual counselors at schools, a high frequency of visits may indicate that they are very active, or that they provide counseling of good quality which attracts students to come and visit them. This implies that the frequency and the quality of counseling plausibly correlate, and it would make us at least partly evaluate the effects of good quality counseling rather than just the average quality of counseling.

A final measurement issue is that we standardize the counseling variable using the distribution of average counseling at the level of the secondary school. This requires a consistent measure of the variance, but our average counseling at the school level is likely to contain measurement error which is inversely related to the number of observed students per school. We then risk overestimating the variance and thereby also the potential impact of a standard deviation change in the intensity of study counseling. We correct for this by running a regression of the measured variance at the school level on a constant and the inverse of the number of students per school. The constant of this regression gives a consistent measure of the variance corrected for measurement error.<sup>17</sup>

### 3.2.2 *School specific confounders*

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<sup>17</sup> Formally, we assume our approximate school specific probability of seeing a counsellor in a school ( $\bar{s}_{jt}$ ) is equal to the true school average ( $\bar{s}_{sch}$ ) plus measurement error ( $e_{sch}$ ), with the error inversely related to the observed number of students per school ( $N_{sch}$ ). Then,

$Var(\bar{s}_{jt}) = Var(\bar{s}_{sch}) + Var(e_{sch})$ , where  $Var(e_{sch}) = \frac{\bar{s}_{sch}(1 - \bar{s}_{sch})}{N_{sch}}$ . The variance corrected for measurement error is the constant ( $\gamma_0$ ) in the regression:  $Var(\bar{s}_{jt}) = \gamma_0 + \gamma_1(1/N_{sch}) + \varepsilon_{sch}$ .

The main threat to our identification strategy is arguably that unobserved school specific characteristics are related to study counseling practices. For instance, schools from relatively rich areas may tend to provide better or more counseling, but their students may be good at gathering information in the first place. To address this,  $X_j$  in equation (3) includes a large set of school average characteristics: parental education, immigrant status, time preference, risk aversion, cognitive ability, anxiety, self perception, self-confidence and locus of control. The robustness of our results to the inclusion of these control variables serves as a first indication that school specific factors do not undermine our IV estimates.

In addition, one may note that if our IV reflects some unobserved school quality variable, one would also expect the other school specific average characteristics to explain counseling incidence. However, none of 12 parameters pertaining to the school averages of parents' social background and/or pupils' personality traits is significant at a five percent level. In contrast, our IV which is also constructed as the average of students  $j \neq i$  from the same school as the respondent, is highly significant with  $p$ -values below .001. The results are thus consistent with the idea that the probability of seeing a counselor contains a non-trivial element of random variation across schools.

However, since it is a key factor of this study, let us for the sake of argument assume that school endogeneity tends to exaggerate the impact of counseling. The baseline OLS estimates in Table 3, which are close to zero, would then make sense only if some other unobservable also generates bias towards zero (e.g. uncertain individuals tend to see counselors). If we add school fixed effects, school endogeneity is taken into account (while individual endogeneity within school remains). This specification yields a  $b_3$  coefficient of -.0011 ( $p$ -value .374), which is similar to Table 3. Thus, when controlling for unobserved school level factors, there is only a

small impact on the estimate, suggesting that potential bias originating from school endogeneity is modest (see Section 5 for fixed effects in the IV framework).<sup>18</sup>

Outside of school hours, one might also suspect that families' support differs systematically between schools. In our data, individuals were asked whether they formed an image of their education or profession via family members' education or profession. About 30% of the pupils stated that they formed the image using such information, but the school average of this variable is unrelated to the individual's use of this information (i.e. the first stage is insignificant). Support from the family can therefore not account for school specific variation in the amount of help students receive when making their choice.

Still, since an IV approach does not allow us to technically exclude the possibility that a confounder exists which is school specific, correlated with  $S_{jt}$  and  $Q_{it+1}$ , but uncorrelated with the control variables, we also ran IV regressions using other school specific measures of actions to guide students in their educational choices. These measures include "lessons about educational choice were provided" (82 percent stated there were), whether "people came to talk about their professions" (52 percent) and "how often did you go to an information day?" (5 percent reported zero, 10 percent five times or more, the mode is two). These are all positively correlated with the counseling indicator (significant at a .01 level) but yield no statistically significant IV estimates. Thus, potential school specific confounders must, in addition to the conditions above, be uncorrelated with these other school specific guidance policies (further discussed in Section 5).

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<sup>18</sup> The coefficient could be driven towards zero by measurement error bias, which is exacerbated when one uses fixed effects. However, with the stated assumptions, one would have expected bias from individual endogeneity to generate a positive coefficient (underestimating the effect of counseling), since this would have been the most likely mechanism keeping down the estimates in Table 3.

### 3.2.3 *Individual confounders*

Concerning unobserved individual traits, the IV is not based on any direct information on individual  $i$ . Potential bias may then only arise indirectly, through correlations between individual traits and school quality (which we just discussed) or peer-effects, which might be considered a hybrid between individual and school specific traits. Peer effects originate from the social environments generated among members of a group of friends or of a classroom. This is a problem if peers  $j$  affect individual  $i$  but also if student  $i$  affects peers (and who potentially in turn will influence him/her and so on, the so called reflection problem (Manski 1993)).

The main concern here is that individuals from the same school in our survey met the same classroom/teacher, or were in the same circle of friends. Our IV could then pick up e.g. that forward looking peers affect both the probability of seeking counseling and the quality of educational choice, which would bias our estimates.

Our sample consists of relatively few respondents from each school, who each completed an Internet survey. For peers to have a major influence on both the probability of seeing a counselor and the quality of educational choice, one needs to assume 1) that the relatively few respondents from each school were part of the same circle of friends/classrooms or other partial environments when in high school; 2) that they influence one another to complete the Internet survey; 3) that our respondents still remain in contact with their high-school peers 18 months after graduation from tertiary education; 4) that few others from the same school, outside the peer group, completed the survey (as they would dilute the peer effect on our IV) and 5) that assumptions 1-4 would have to hold across a non-trivial proportion of our 567 schools represented. To us, the chance that these requirements are all fulfilled appears too improbable to be of major importance, especially given the fact that peer-effects are partly included in our

average school characteristics, which we found to have modest influence in our regressions. To decrease the risk of peer effects even further, we redefined the IV in robustness checks to reflect the average incidence of counseling for students from the same school but who did not graduate in the same year as the respondent. We report results from these IV regressions in Section 5.

#### **4. Results**

Our main results – presented in Table 6 – indicate that in a school which offers one standard deviation more counseling, the probability to prefer a different field of education is reduced by approximately 2 percentage points. The estimate remains robust as we gradually include background characteristics and personality traits of individuals and same school pupils' averages. The statistical power drops slightly between columns (4) and (5) from a  $p$ -value of .049 to .063 when we add the squares of the personality traits.

-- TABLE 6 --

Taken at face value, the magnitude of our estimate implies that if counseling can be increased by a standard deviation, the average probability to prefer a different field will decrease by 9 percent (2 percentage points less than the original level of 22 percent). We consider these estimates to be large, especially since counseling is relatively inexpensive. The survey of the counselors indicates that the average time of a counseling session is about 25 minutes per student and per meeting. In comparison, the costs which might be avoided are potentially large for the individual and from society's point of view since some students who in retrospect would choose a different education may seek employment in a different line of work, others may continue

working in the field they chose at the cost of a lower level of utility and/or productivity and others may re-enroll in a different education to correct their choice. In our sample, a low quality choice is correlated with continuing schooling ( $p$ -value 0.003). This is in line with results in Borghans and Golsteyn (2007) who, using a different sample, found the indicator of low quality of educational choice to be linked with a higher probability of re-enrollment in a different field of education at an adult age.<sup>19</sup>

Table 7 separates the results for different subgroups. The point estimates of the effect of counseling are much larger for men (-0.048) than for women (-0.010), with the latter also insignificantly different from zero.<sup>20</sup> Separate regression estimates for groups with different educational tracks at secondary level display large point estimates for individuals who attended the lowest secondary tracks (-0.042), while the effects for higher educational tracks are smaller and insignificant. The lowest track has the strongest focus on vocational education and students are traditionally recruited from relatively less affluent families. Restricting our sample to individuals with parents who have lower educational attainment than the median yields a

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<sup>19</sup> For a year of adult education, calculations in Stenberg (2011) indicate a cost of at least €10,000 in individual foregone earnings. However, the need for re-schooling can only partly be addressed by counseling as it may be related to events which are impossible to foresee.

<sup>20</sup> Table A5 in Appendix 2 shows the OLS regressions for the subgroups, overall indicating coefficient values very close to zero. The OLS is significant for women but not for men, while when we use our IV, we find the opposite. A potential explanation is that males and females differ in their sensitivity to react to counseling behaviors. Carrell and Sacerdote (2013) report a reverse pattern, with significant findings on college attendance for females but none for males. Among many potential reasons for the different gender patterns, the treatment in Carrell and Sacerdote includes mentoring and a cash grant, using observed college enrolments as outcome. As mentioned earlier, the individuals' own assessment of their educational choice in our study is a different concept and the time-frame is 6-7 years. Carrell and Sacerdote (p. 17-21) suggest various mechanisms to explain the gender dissimilarity, and these may differ between our studies. In addition, gender differences could be affected by the validity of a LATE estimator and possibly also by the educational systems in the US and the Netherlands respectively, if they affect the importance of counselling differently for males and females. We leave this issue for future research.

significant effect of counseling (-0.038), whereas those whose parents have higher educational attainments than the median are associated with a modest estimate (-0.007, insignificant). The point estimate for individuals with immigrant background is high in absolute terms (-0.051) but there is a lack of precision in the estimates, as well as an insignificant first stage estimate, presumably due to the smaller sample (N = 413).<sup>21</sup> When excluding immigrants, our results are similar to those reported in Table 6. In sum, a possible interpretation is that males from relatively low socioeconomic groups drive our overall significant results.<sup>22</sup>

-- TABLE 7 --

## **5. Robustness Analyses**

In this section, we present results from robustness checks to further check the validity of our IV strategy, complementing our discussions with respect to school endogeneity (Section 3.2.2) and individual endogeneity or peer effects (3.2.3).

First, to assess if some unobserved school specific confounder(s) make our IV regressions overestimate the effects of counseling, one may note that if school level factors tend to simultaneously influence counseling and quality of educational choice, one would also expect our observable school characteristics related to family background and pupil personality traits to have some impact on our IV estimates. However, the estimates in Table 6 remain remarkably stable as we add explanatory variables, providing little indication that school factors would drive the results.

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<sup>21</sup> Analyzing the effects for the separate subgroups simultaneously, using interaction variables, yield significant differences between gender and between the low and the high secondary school tracks (see table A7).

<sup>22</sup> The latter is in line with the findings in Cunha and Miller (2009).

Second, we have in total information on twelve guidance measures, of which three are strongly and positively correlated with the counseling indicator (significant at a .01 level, these were mentioned in Section 3.2.2). Results from IV regressions using other measures of guidance yield no statistically significant estimate on the quality of educational choice.<sup>23</sup> Thus, a potential confounding factor must not only correlate with school counseling practices and students' quality of educational choice, but also *not* correlate with any of the eleven other measures of guidance at the school level. This is in addition to not correlating with the observable school averages of parents' social background, education and immigrant status, with school averages of pupils' IQ, levels of anxiety and confidence as well as our four other personality traits.

Third, it might appear reasonable to include school fixed effects in our IV framework, either as explanatory variables (included in both the first and the second stage) or as an additional set of (567) instrumental variables (only included in the first stage), as it would explicitly control for school endogeneity. Note however that the first stage predictive power is then enhanced by the counseling incidence of the individuals themselves. This implies an obvious risk of over-identification which leads us back to the original endogeneity problem. As expected, running this estimation produces a coefficient estimate close to the OLS parameter (-

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<sup>23</sup> See appendix table A8 for the results. These results are also insignificant for our subgroups. Exceptions are that "people came to talk about their professions" is significant at the 10% level for those with higher educated parents. And "how often did you go to an information day" is significant at the 5% level for those from the higher track and at the 10% level for immigrants. The other measures of guidance are "Been to educational choice meeting in Utrecht", "School has subscription to magazine about educational choice", "Test for educational or professional choice", "Extended documentation about educations and professions at school", "I have had personal conversations with a mentor", "I have spoken with friends about the educational choice", "I have spoken with my parents about the educational choice", "I made contact with people working or studying in the fields I thought were interesting" and "I or my parents contacted a professional educational choice agency".

.0025,  $p$ -value .078).<sup>24</sup> Overall, our analyses indicate that unobserved factors at the school level can only account for modest bias, demonstrating support for our key assumption; that the variation in our original IV ( $S_{jt}$ ) comes from the counselor and not from the school. When excluding the school fixed effects,  $S_{jt}$  provides a continuous measure of the probability of seeing a counselor which is not flawed by the endogeneity of the individuals' own decisions.

Another concern may be that, because of the varying size of the samples per school, measurement errors make the first stage heteroscedastic with respect to the number of students per school. This is foremost a problem in case the number of students per school responding to our survey is systematically related to the school counseling policy. We address this by interacting our IV with the number of people per school (in line with Card 1995), employing three different specifications where we *i*) interact the IV with number of observations from the school ( $N_{sch}$ ), *ii*) interact the IV with above and below median of  $N_{sch}$  (10), and *iii*) interact the IV with quartiles of  $N_{sch}$  (5, 10 and 15). Table 8 shows that the effects remain similar.

--TABLE 8--

Fourth, the IV may pick up peer effects between the students. However, each school is represented by relatively small samples of individuals who responded to the Internet survey, arguably making it unlikely in the first place that the students know each other or affect each other's answers (see Section 3.2.3). To further address this concern, we redefine our IV into the average counseling of individuals who graduated from the same secondary school but not in the same year as the individual. The results, reported in Table 9, show that the effect of counseling

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<sup>24</sup> Including  $f_s$  as additional covariate, i.e. also included in the second stage regression, yield similar results.

on educational choice quality remains similar and that this also holds for the subgroups. There is only a minor change in the first stage coefficient of our IV (from .5651 to .5162), further supporting the hypothesis that peer effects do not drive the estimates.

--TABLE 9 --

## **6. Mechanisms**

Given that counselors affect the quality of educational choice, we next consider if data may assist us to disentangle some of the underlying mechanisms. In the additional survey of the counselors, there were questions on the topics they discussed with the students during the individual counseling sessions. The answer categories included the awareness of the students' motivation and competences, information about the courses given in secondary school, information about the courses given in tertiary education, and information about the labor market, including knowledge about the labor market, information about apprenticeships and insights in professions (answers were given on a scale from 1. Never – 5. Very often). We find our IV to be significantly related with conversations about the awareness of the students' motivation and competences but not with the other answer categories. Tentatively, one may infer that the counseling variable we use as an IV primarily reflects actions addressing the individual's uncertainty about his/her own utility function (future preferences), rather than information about objective measures such as wages and/or employment probabilities.<sup>25</sup>

To analyze this issue further, we use our IV approach to see if counseling affects employment status (self reported, 78.0 percent). If employment probabilities consist of a

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<sup>25</sup> A caveat is that we have no information on whether counselors approach individuals differently with respect to e.g. social background factors or ethnicity.

permanent part and transitory shocks, counselors are in theory able to provide information to students about the permanent part. Our IV estimates are statistically insignificant throughout our subsamples (full sample  $p$ -value of .605), consistent with the idea that our LATE estimates of counseling are not primarily driven by information on employment probabilities.<sup>26</sup> The result is in line with Beffy et al. (2012), who report that non-monetary aspects are important for the choice of major at French universities. An obvious reservation is that employment status here is only measured 18 months after graduation, with differences perhaps emerging later. Future studies with longer time frames will be necessary to work out these mechanisms more precisely.

## 7. Conclusions

In this paper, we present evidence that the quality of the educational choice is improved by study counseling. Our results indicate that visiting a study counselor decreases the average probability to prefer a different educational field by 2 percentage points (from 22 percent), corresponding to a 9 percent decrease. The groups which we would expect to have the least information at the outset, students with low educated parents, appear to have the largest marginal effects of added information through counseling. Our main contribution is to have provided empirical evidence to support the hypothesis that counseling matters for the quality of educational choice. This complements in three ways the large number of studies which report that information matters for educational choice (for references, see introduction). First, our treatment variable is a policy tool which exists in many countries. Second, our results are obtained despite a considerably longer time-span than previous studies as outcomes are assessed after graduation, encompassing

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<sup>26</sup> Note that within this framework, using employment incidence (or wage levels) as the outcome of interest is potentially misleading. Employment following acceptance of a low wage-offer may signal a low quality of educational choice. Wage levels may in addition carry little information only 18 months after graduation.

individuals' actual (rather than expected) experiences of their educational choice and initial labor market careers. Third, our outcome variable considers the individuals' own assessments which means we take into account the weights attached to various aspects of the chosen career path. One may also note that our result is in line with evaluations of randomized job-search counseling, which indicate beneficial effects on labor market outcomes of improving information and/or motivation through individual meetings with professionals (Behaghel et al. 2012, Crépon et al. 2005, Hainmüller et al. 2009, Pedersen et al. 2012).

Concerning the interpretation of the quantitative effect, we would advocate caution since the frequency and the quality of counseling is likely to correlate. This means that our results partly reflect the impact of good quality counseling rather than the average quality of counseling. More research is needed to better understand the anatomy of uncertainty. We do not know if the main uncertainty concerns information on wages or earnings in different sectors, typically of interest to economists but which technically is available to students, or whether it is a question of uncertainty about the individual's own (future) utility function. We tentatively address this issue, finding that uncertainty about own utility may be at least as important as uncertainty about wages and/or employment prospects.

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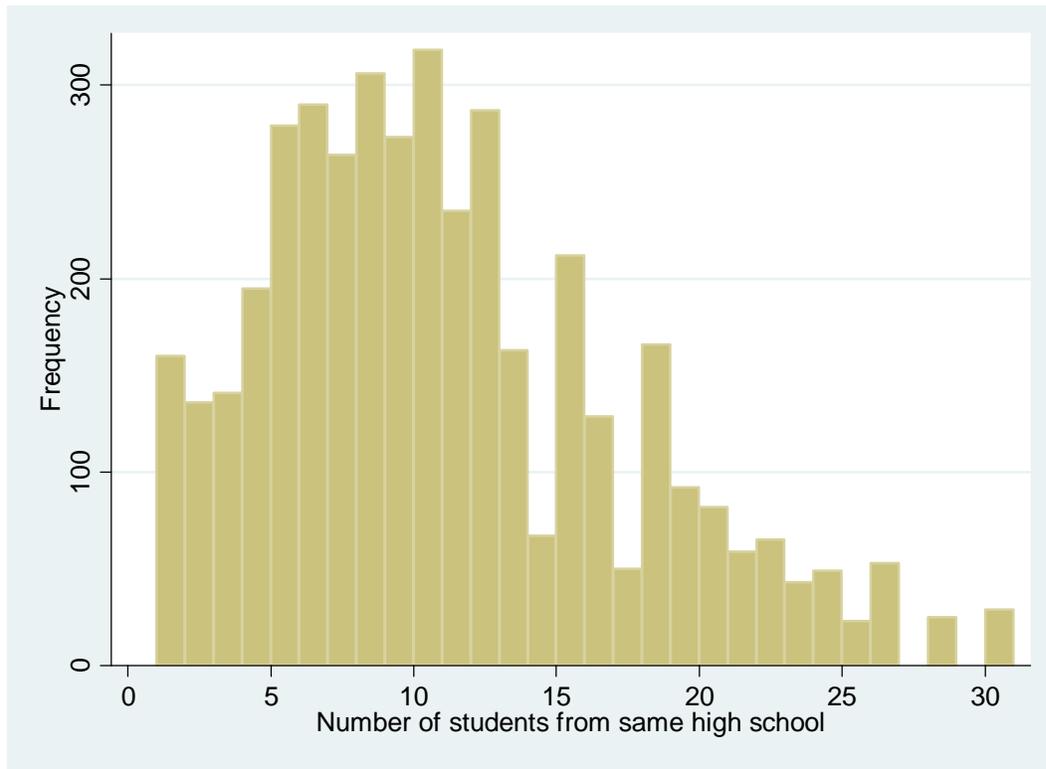
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Table 1  
Frequency of contact with study counselor

	Never	Sometimes	Regularly	Often	Very often	Total
Women	30.3	46.6	15.6	6.3	1.1	100
Men	30.0	46.6	15.8	6.8	0.8	100
Low level secondary (VMBO)	38.4	38.3	15.2	7.0	1.1	100
Middle level secondary (HAVO)	27.8	48.0	15.5	7.6	1.1	100
High level secondary (VWO)	28.2	49.5	16.1	5.4	0.9	100
Natives	30.0	46.8	15.9	6.5	1.0	100
Immigrants	32.2	45.3	13.8	7.0	1.7	100
Parents low education	30.7	45.6	16.5	6.3	0.9	100
Parents high education	30.7	45.9	16.5	5.7	1.2	100
Total	30.2	46.6	15.7	6.5	1.0	100

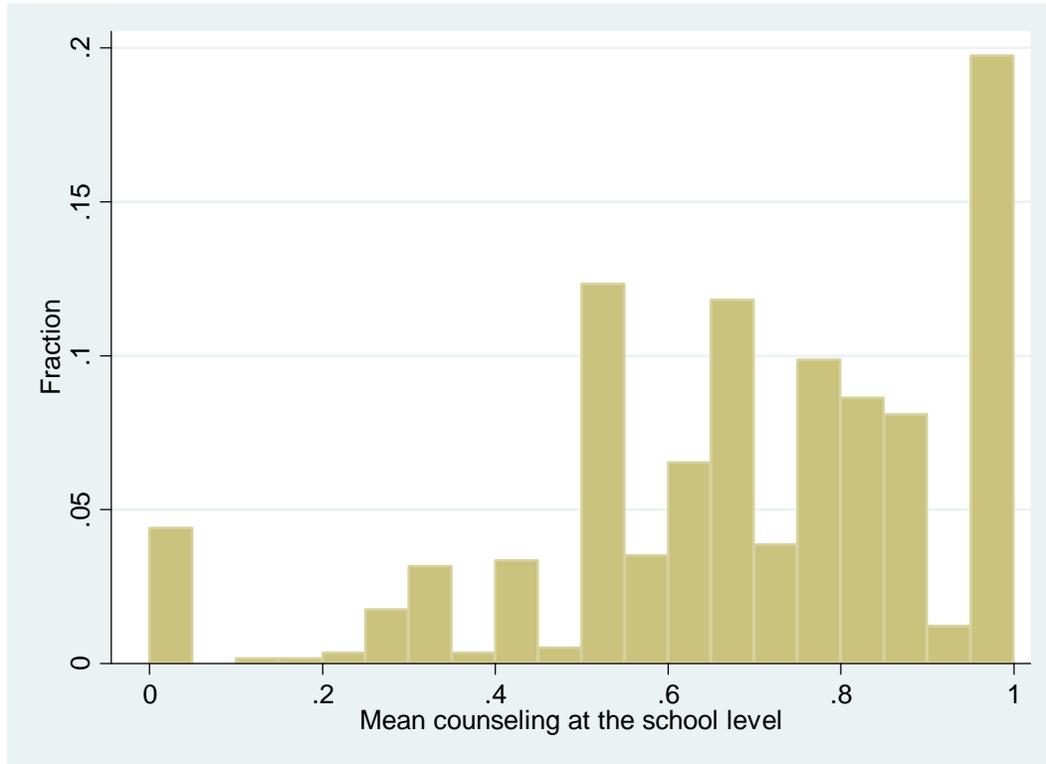
Data source: Supplement survey of the 2004 SIS wave.

Figure 1  
Number of students in the data set from the same secondary school



Data source: Supplement survey of the 2004 SIS wave.

Figure 2  
Histogram of school average amount of counseling.



Data source: Supplement survey of the 2004 SIS wave. This distribution is based on school level data (so not on individual level data).

Table 2  
Quality of educational choice

	Prefers a different field	Prefers the same field	Total
Women	21.8	78.2	100
Men	22.3	77.7	100
Low level secondary (VMBO)	21.8	78.2	100
Middle level secondary (HAVO)	22.2	77.8	100
High level secondary (VWO)	22.0	78.0	100
Natives	21.3	78.7	100
Immigrants	28.8	71.2	100
Parents low education	22.6	77.4	100
Parents high education	20.0	80.0	100
Total	22.0	78.0	100

Data source: Supplement survey of the 2004 SIS wave. The separation between low and high education of the parents is based on the distribution of the level of education among parents. Low level indicates a level lower than the median and high level a level higher than the median level of education.

Table 3  
 OLS estimates of the relationship between study counseling and quality of the educational choice

	(1) Prefers a different field	(2) Prefers a different field	(3) Prefers a different field	(4) Prefers a different field	(5) Prefers a different field
Counseling	-0.0020* (0.0011)	-0.0019* (0.0011)	-0.0020* (0.0011)	-0.0020* (0.0011)	-0.0017 (0.0011)
Men (average)		-0.0150 (0.0398)		-0.0187 (0.0424)	-0.0171 (0.0424)
Age (average)		-0.0046 (0.0071)		-0.0041 (0.0078)	-0.0024 (0.0078)
Educ father (average)		0.0086 (0.0100)		0.0096 (0.0108)	0.0115 (0.0108)
Educ mother (average)		-0.0065 (0.0100)		-0.0018 (0.0107)	-0.0018 (0.0107)
Immigrant (average)		0.1460*** (0.0520)		0.0760 (0.0570)	0.0678 (0.0569)
Discount rate (average)		0.0004 (0.0008)		0.0005 (0.0009)	0.0004 (0.0009)
Risk preference (average)		-0.0002 (0.0005)		-0.0005 (0.0006)	-0.0005 (0.0006)
Locus of control (average)		0.0148 (0.0222)		0.0288 (0.0235)	0.0264 (0.0235)
Anxiety (average)		-0.0459** (0.0198)		-0.0269 (0.0210)	-0.0264 (0.0210)
Self perception (average)		-0.0748*** (0.0230)		-0.0331 (0.0245)	-0.0355 (0.0245)
Self confidence (average)		-0.0261 (0.0220)		-0.0115 (0.0233)	-0.0100 (0.0233)
Cognitive ability (average)		-0.0044 (0.0082)		-0.0073 (0.0089)	-0.0090 (0.0089)
Male			0.0128 (0.0143)	0.0153 (0.0153)	0.0136 (0.0153)
Age=21			-0.1286*** (0.0417)	-0.1288*** (0.0418)	-0.1247*** (0.0417)
Age=22			-0.1666*** (0.0395)	-0.1632*** (0.0398)	-0.1578*** (0.0398)
Age=23			-0.1398*** (0.0389)	-0.1375*** (0.0394)	-0.1349*** (0.0393)
Age=24			-0.1387*** (0.0389)	-0.1370*** (0.0396)	-0.1344*** (0.0395)
Age=25			-0.1057*** (0.0399)	-0.1028** (0.0409)	-0.1017** (0.0408)
Age=26			-0.1136*** (0.0415)	-0.1129*** (0.0428)	-0.1152*** (0.0427)
Age=27			-0.1519*** (0.0441)	-0.1479*** (0.0455)	-0.1481*** (0.0454)
Age=28			-0.1454*** (0.0492)	-0.1403*** (0.0509)	-0.1351*** (0.0508)
Age=29			-0.1277** (0.0576)	-0.1250** (0.0595)	-0.1255** (0.0594)
Age=30			-0.2700*** (0.0664)	-0.2668*** (0.0680)	-0.2669*** (0.0678)
Educ father			-0.0005 (0.0038)	-0.0017 (0.0041)	-0.0026 (0.0041)
Educ mother			-0.0049 (0.0037)	-0.0048 (0.0040)	-0.0043 (0.0040)
Middle level sec. school			0.0428** (0.0177)	0.0436** (0.0178)	0.0372** (0.0178)
High level sec. school			0.0338* (0.0196)	0.0371* (0.0199)	0.0331* (0.0198)
Immigrant			0.0746*** (0.0215)	0.0586** (0.0238)	0.0582** (0.0238)
Discount rate			-0.0000 (0.0003)	-0.0001 (0.0003)	-0.0001 (0.0011)
Risk preference			0.0002 (0.0002)	0.0003 (0.0002)	0.0013** (0.0006)
Locus of control			-0.0090	-0.0128	-0.0421**

			(0.0078)	(0.0083)	(0.0190)
Anxiety			-0.0203***	-0.0170**	-0.0192
			(0.0069)	(0.0074)	(0.0362)
Self perception			-0.0459***	-0.0413***	-0.0285**
			(0.0082)	(0.0088)	(0.0119)
Self confidence			-0.0149*	-0.0141*	0.0036
			(0.0077)	(0.0082)	(0.0111)
Cognitive ability			-0.0016	-0.0004	0.0129
			(0.0033)	(0.0035)	(0.0097)
Discount rate squared					-0.0000
					(0.0000)
Risk preference squared					-0.0000*
					(0.0000)
Locus of control squared					0.0101*
					(0.0060)
Anxiety squared					0.0004
					(0.0044)
Self perception squared					0.0093*
					(0.0051)
Self confidence squared					0.0109**
					(0.0044)
Cognitive ability squared					-0.0019
					(0.0013)
Constant	0.2205***	0.4264**	0.3785***	0.5192**	0.4622**
	(0.0064)	(0.1988)	(0.0518)	(0.2107)	(0.2235)
Observations	4,191	4,191	4,191	4,191	4,191
R-squared	0.001	0.009	0.029	0.032	0.038

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. Educ Father and Mother represent the highest level of education that the father or mother graduated from. "average" indicates that school averages have been calculated.

Table 4

First stage results: the effect of average amount of counseling by students of the same secondary school on individual's counseling

	(1) Counseling	(2) Counseling	(3) Counseling	(4) Counseling	(5) Counseling
Instrument	0.6289***	0.5916***	0.6116***	0.5792***	0.5651***
(average counselling)	(0.0904)	(0.0913)	(0.0905)	(0.0912)	(0.0912)
Men (average)		-0.1680		0.0380	0.0050
		(0.5642)		(0.6044)	(0.6038)
Age (average)		-0.0643		-0.1814	-0.1882*
		(0.1000)		(0.1114)	(0.1114)
Educ father (average)		0.0424		0.0105	-0.0094
		(0.1422)		(0.1533)	(0.1533)
Educ mother (average)		-0.2698*		-0.2775*	-0.2703*
		(0.1411)		(0.1522)	(0.1521)
Immigrant (average)		-0.4950		-0.4711	-0.4151
		(0.7376)		(0.8125)	(0.8122)
Discount rate (average)		-0.0115		-0.0061	-0.0046
		(0.0119)		(0.0128)	(0.0128)
Risk preference (average)		-0.0080		-0.0110	-0.0110
		(0.0076)		(0.0080)	(0.0080)
Locus of control (average)		-0.2148		-0.1951	-0.1812
		(0.3138)		(0.3352)	(0.3351)
Anxiety (average)		-0.0916		-0.1530	-0.1458
		(0.2808)		(0.2993)	(0.2990)
Self perception (average)		0.2014		0.3002	0.2951
		(0.3254)		(0.3485)	(0.3485)
Self confidence (average)		-0.2703		-0.4128	-0.4187
		(0.3115)		(0.3322)	(0.3320)
Cognitive ability (average)		0.0914		0.0091	0.0217
		(0.1157)		(0.1265)	(0.1265)
Male			0.1144	0.1011	0.0998
			(0.2035)	(0.2173)	(0.2173)
Age=21			0.0450	0.0800	0.0768
			(0.5942)	(0.5953)	(0.5948)
Age=22			0.0348	0.1097	0.0447
			(0.5630)	(0.5669)	(0.5666)
Age=23			0.0877	0.2195	0.1781
			(0.5547)	(0.5612)	(0.5607)
Age=24			-0.3170	-0.1394	-0.1789
			(0.5543)	(0.5641)	(0.5635)
Age=25			-0.0901	0.1411	0.1540
			(0.5684)	(0.5826)	(0.5819)
Age=26			-0.1729	0.1364	0.1708
			(0.5915)	(0.6091)	(0.6084)
Age=27			-0.0729	0.2031	0.1846
			(0.6278)	(0.6473)	(0.6468)
Age=28			-0.7189	-0.3886	-0.4526
			(0.7009)	(0.7245)	(0.7241)
Age=29			-1.5969*	-1.1337	-1.1336
			(0.8202)	(0.8473)	(0.8461)
Age=30			0.1753	0.6233	0.6340
			(0.9450)	(0.9679)	(0.9668)
Educ father			-0.0089	-0.0019	0.0074
			(0.0536)	(0.0579)	(0.0579)
Educ mother			-0.0123	0.0360	0.0294
			(0.0531)	(0.0575)	(0.0575)
Middle level sec. school			1.2358***	1.2573***	1.2883***
			(0.2511)	(0.2521)	(0.2530)
High level sec. school			1.3081***	1.3855***	1.3970***
			(0.2778)	(0.2820)	(0.2820)
Immigrant			-0.1604	-0.0270	-0.0219
			(0.3061)	(0.3391)	(0.3390)
Discount rate			-0.0035	-0.0027	-0.0170
			(0.0044)	(0.0047)	(0.0157)
Risk preference			0.0006	0.0020	0.0005
			(0.0026)	(0.0027)	(0.0084)
Locus of control			-0.0296	0.0067	0.0439
			(0.1105)	(0.1184)	(0.2712)

Anxiety			0.0764 (0.0988)	0.0937 (0.1055)	1.3762*** (0.5149)
Self perception			-0.0486 (0.1172)	-0.0936 (0.1257)	-0.2611 (0.1698)
Self confidence			0.0670 (0.1092)	0.1179 (0.1167)	-0.0288 (0.1577)
Cognitive ability			-0.0216 (0.0467)	-0.0242 (0.0500)	-0.0324 (0.1376)
Discount rate squared					0.0002 (0.0002)
Risk preference squared					0.0000 (0.0001)
Locus of control squared					-0.0066 (0.0861)
Anxiety squared					-0.1590** (0.0621)
Self perception squared					-0.1164 (0.0726)
Self confidence squared					-0.0840 (0.0632)
Cognitive ability squared					0.0007 (0.0181)
Constant	0.1198 (0.0903)	3.8569 (2.8154)	-0.8636 (0.7373)	5.6306* (3.0001)	3.6021 (3.1859)
Observations	4,191	4,191	4,191	4,191	4,191
R-squared	0.011	0.014	0.022	0.025	0.030

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable "Counseling" is standardized at the school level as described in the data section. Educ Father and Mother represent the highest level of education that the father or mother graduated from. "average" indicates that school averages have been calculated "Average counseling in same secondary school" is the average amount of counseling by students of the same secondary school as the respondent, standardized to mean zero and standard deviation 1. Educ Father and Mother represent the highest level of education that the father or mother graduated from. "average" indicates that school averages have been calculated.

Table 5  
 Information from additional survey among study counselors in 2008 (standard errors are reported in parentheses).

	Group with IV below median	Group with IV above median
Mean number of counselors at middle level secondary school	0.663 (0.037)	0.850 (0.039)
Mean number of counselors at high level secondary school	0.551 (0.028)	0.817 (0.039)
Percentage middle level secondary school students who attends a counseling session once	38.95 (1.64)	47.03 (1.62)
Percentage middle level secondary school students who attends a counseling session more than once	7.87 (0.55)	14.33 (1.00)
Percentage high level secondary school students who attends a counseling session once	61.51 (1.58)	66.93 (1.41)
Percentage high level secondary school students who attends a counseling session more than once	22.98 (1.21)	27.74 (1.34)
Mean answer to “does school have enough information to guide students”	0.780 (0.018)	0.825 (0.016)

Table 6  
The effect of counseling on the quality of educational choice

	(1) Prefers a different field	(2) Prefers a different field	(3) Prefers a different field	(4) Prefers a different field	(5) Prefers a different field
Counseling	-0.0226** (0.0106)	-0.0227** (0.0114)	-0.0225** (0.0108)	-0.0228** (0.0115)	-0.0219* (0.0118)
Men (average)		-0.0198 (0.0416)		-0.0189 (0.0443)	-0.0179 (0.0441)
Age (average)		-0.0060 (0.0074)		-0.0080 (0.0084)	-0.0062 (0.0084)
Educ father (average)		0.0094 (0.0105)		0.0098 (0.0112)	0.0112 (0.0112)
Educ mother (average)		-0.0133 (0.0110)		-0.0086 (0.0118)	-0.0083 (0.0117)
Immigrant (average)		0.1285** (0.0550)		0.0593 (0.0601)	0.0529 (0.0598)
Discount rate (average)		0.0001 (0.0009)		0.0003 (0.0009)	0.0003 (0.0009)
Risk preference (average)		-0.0004 (0.0006)		-0.0008 (0.0006)	-0.0008 (0.0006)
Locus of control (average)		0.0091 (0.0233)		0.0234 (0.0247)	0.0215 (0.0246)
Anxiety (average)		-0.0478** (0.0207)		-0.0300 (0.0220)	-0.0292 (0.0219)
Self perception (average)		-0.0702*** (0.0241)		-0.0265 (0.0258)	-0.0292 (0.0257)
Self confidence (average)		-0.0333 (0.0233)		-0.0214 (0.0249)	-0.0197 (0.0249)
Cognitive ability (average)		-0.0023 (0.0086)		-0.0069 (0.0093)	-0.0082 (0.0092)
Male			0.0148 (0.0149)	0.0172 (0.0160)	0.0155 (0.0159)
Age=21			-0.1284*** (0.0435)	-0.1279*** (0.0436)	-0.1238*** (0.0434)
Age=22			-0.1668*** (0.0412)	-0.1620*** (0.0415)	-0.1581*** (0.0414)
Age=23			-0.1387*** (0.0406)	-0.1337*** (0.0412)	-0.1320*** (0.0410)
Age=24			-0.1456*** (0.0407)	-0.1403*** (0.0414)	-0.1385*** (0.0412)
Age=25			-0.1088*** (0.0416)	-0.1010** (0.0427)	-0.0996** (0.0425)
Age=26			-0.1181*** (0.0434)	-0.1106** (0.0446)	-0.1122** (0.0445)
Age=27			-0.1539*** (0.0460)	-0.1441*** (0.0475)	-0.1449*** (0.0473)
Age=28			-0.1626*** (0.0521)	-0.1505*** (0.0534)	-0.1464*** (0.0533)
Age=29			-0.1641*** (0.0630)	-0.1515** (0.0638)	-0.1512** (0.0636)
Age=30			-0.2640*** (0.0692)	-0.2508*** (0.0715)	-0.2512*** (0.0712)
Educ father			-0.0007 (0.0039)	-0.0018 (0.0042)	-0.0024 (0.0042)
Educ mother			-0.0054 (0.0039)	-0.0041 (0.0042)	-0.0038 (0.0042)
Middle level sec. school			0.0687*** (0.0229)	0.0702*** (0.0237)	0.0637*** (0.0241)
High level sec. school			0.0609** (0.0249)	0.0662** (0.0262)	0.0616** (0.0265)
Immigrant			0.0696*** (0.0225)	0.0577** (0.0249)	0.0575** (0.0248)
Discount rate			-0.0001 (0.0003)	-0.0002 (0.0003)	-0.0005 (0.0012)
Risk preference			0.0002 (0.0002)	0.0003 (0.0002)	0.0014** (0.0006)

Locus of control			-0.0096 (0.0081)	-0.0125 (0.0087)	-0.0405** (0.0198)
Anxiety			-0.0188*** (0.0073)	-0.0151* (0.0078)	0.0085 (0.0410)
Self perception			-0.0467*** (0.0086)	-0.0432*** (0.0093)	-0.0338*** (0.0128)
Self confidence			-0.0140* (0.0080)	-0.0119 (0.0086)	0.0025 (0.0115)
Cognitive ability			-0.0020 (0.0034)	-0.0010 (0.0037)	0.0125 (0.0101)
Discount rate squared					0.0000 (0.0000)
Risk preference squared					-0.0000* (0.0000)
Locus of control squared					0.0098 (0.0063)
Anxiety squared					-0.0028 (0.0049)
Self perception squared					0.0068 (0.0055)
Self confidence squared					0.0090* (0.0047)
Cognitive ability squared					-0.0019 (0.0013)
Constant	0.2229*** (0.0068)	0.5209** (0.2136)	0.3637*** (0.0545)	0.6506*** (0.2315)	0.5488** (0.2380)
Observations	4,191	4,191	4,191	4,191	4,191

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. This variable is instrumented with the average amount of counseling by students of the same secondary school. Educ Father and Mother represent the highest level of education that the father or mother graduated from. "average" indicates that school averages have been calculated.

Table 7

The effect of counseling on the quality of the educational choice by subgroups

	(1) Women	(2) Men	(3) Low sec educ	(4) Middle sec educ	(5) High sec educ	(6) Parents low	(7) Parents high	(8) Immigrants	(9) Natives
Counseling	-0.0092 (0.0132)	-0.0472** (0.0240)	-0.0404** (0.0194)	-0.0165 (0.0230)	-0.0024 (0.0176)	-0.0375** (0.0147)	-0.0083 (0.0248)	-0.0605 (0.1060)	-0.0197* (0.0117)
Full set of controls	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl
Observations	2,650	1,541	1,080	1,653	1,813	1,277	1,492	413	3,778

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. This variable is instrumented with the average amount of counseling by students of the same secondary school. A full set of controls (see table 7) is included in all regressions.

Table 8

The effect of counseling on the quality of the educational choice taking into account potential heterogeneity with respect to the size of the school

	(1) Linear	(2) Linear	(3) Median	(4) Median	(5) Quartiles	(6) Quartiles
	Incl same cohort	Not incl same cohort	Incl same cohort	Not incl same cohort	Incl same cohort	Not incl same cohort
Counseling	-0.0190*	-0.0222*	-0.0228*	-0.0253**	-0.0177*	-0.0212*
	(0.0107)	(0.0122)	(0.0117)	(0.0127)	(0.0105)	(0.0114)
Full set of controls	Incl	Incl	Incl	Incl	Incl	Incl
Observations	4,191	4,165	4,191	4,165	4,191	4,165

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. The table presents 3 variants of 2 specifications of the instrument. In the specification "Incl same cohort" the counseling variable is instrumented with the average amount of counseling by students from the same secondary school. In the specification "Not incl same cohort" the variable is instrumented with the average amount of counseling by students from the same secondary school who did not graduate in the same year as the individual. In the Linear variant the instrument is replaced by the instrument, a variable indicating the number of people in a school, and the interaction between these two variables. In the Median variant, the instrument is replaced by the instrument, a dummy variable which has the value 1 if the number of individuals in the school is larger than 10 (the median), and the interaction between these two variables. In the Quartiles variant, the instrument is replaced by the instrument, 3 dummy variables of which the first has value 1 if the number of students in the school was between 5 (the first quartile) and 10, the second has a value 1 if the number was between 10 and 15 (the third quartile) and the third has value 1 if the number was more than 15, and interactions between the instrument and these dummy variables. A full set of controls (see table 7) is included in all regressions.

Table 9

The effect of counseling on the quality of the educational choice using the instrument which excludes students from the same cohort

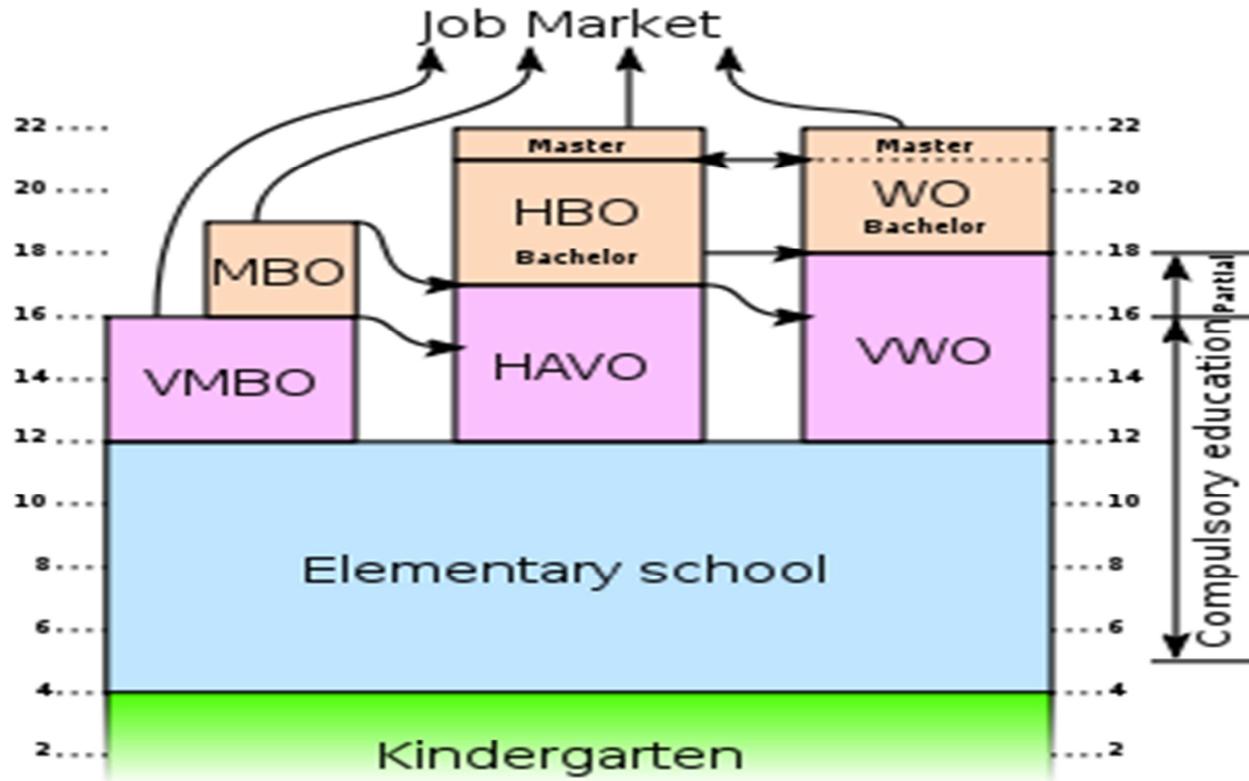
	(1) Full sample	(2) Women	(3) Men	(4) Low sec educ	(5) Middle sec educ	(6) High sec educ	(7) Parents low	(8) Parents high	(9) Immigrants	(10) Natives
Counseling	-0.0244* (0.0130)	-0.0142 (0.0158)	-0.0413* (0.0223)	-0.0343 (0.0231)	-0.0157 (0.0233)	-0.0120 (0.0196)	-0.0401** (0.0175)	-0.0105 (0.0252)	-0.0366 (0.1246)	-0.0228* (0.0130)
Full set of controls	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl
Observations	4,165	2,635	1,530	1,072	1,649	1,798	1,272	1,478	408	3,757

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. This variable is instrumented with the average amount of counseling by students from the same secondary school who did not graduate in the same year as the individual. A full set of controls (see table 7) is included in all regressions.

## Appendix 1 The Dutch educational system

Figure A1

The Dutch educational system



Primary education (age 4-12)

*Courses taught at same level to all students*

*Last year primary school (age 12):*

*CITO Achievement test and advice elementary school teachers determine allocation to VMBO or HAVO and VWO secondary school level*

Three levels of secondary education:

- VMBO (4 years), preparing for vocational education
- HAVO (5 years), preparing for professional college
- VWO (6 years), preparing for university

*Within level: courses taught at same level to all students*

*1<sup>st</sup> year secondary school (age 13):*

- Grades determine allocation to middle or upper track secondary school level

Three levels of tertiary education:

- MBO: vocational education
- HBO: professional college
- WO: university

*Within level: courses taught at same level to all students*

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## Appendix 2

Table A1  
Quality of educational choice in various countries

	Average answer	N	St. dev.	Percentage preferring a different field (answering 4 not likely or 5 not likely at all)
Italy	2.3	2991	1.3	23.7
Spain	2.2	3001	1.3	20.4
France	2.2	3011	1.3	21.0
Austria	2.1	2286	1.3	19.5
Germany	2.2	3464	1.3	20.5
The Netherlands	2.3	3059	1.2	18.1
UK	2.4	3351	1.4	24.8
Finland	2.1	2648	1.2	17.5
Sweden	2.2	2606	1.3	20.0
Norway	2.1	3280	1.2	15.1
Czech Republic	2.3	3076	1.2	24.4
Japan	2.7	3287	1.3	30.7
Total	2.3	36058	1.3	21.4

Source: CHEERS, 1998. Graduates from higher vocational education and university were approached 3 years after graduation with the question 'Looking back, if you were free to choose again, would you choose the same study program?'. The answers are scaled from (1) 'very probable' to (5) 'not likely at all'.

Table A2  
Analyses of data attrition

	Sample 1 Respondents first wave	Sample 2 Respondents second wave after selecting usable cases
% Male	44.1	36.8
Average age	24.1	24.2
% Low level tertiary (MBO)	25.5	16.0
% Middle level tertiary (HBO)	47.8	54.0
% High level tertiary (University)	26.6	30.0
% Immigrants	12.2	9.9
% Low quality educational choice	22.9	22.0
N	27,929	4,191

Data source: 2004 SIS and Supplement survey of the 2004 SIS. In both data we selected MBO, HBO, and University respondents between the ages of 20 and 30.

Table A3  
Averages of individual characteristics by gender and the incidence of seeing a counselor

	Women			Men		
	No counseling	Counseling		No counseling	Counseling	
Age	23.95	23.95		24.42	24.55	
Education father	4.50	4.57		4.52	4.43	
Education mother	3.64	3.65		3.67	3.58	
% low level secondary school	0.32	0.23	***	0.30	0.24	***
% middle level secondary school	0.37	0.41	***	0.35	0.41	***
% high level secondary school	0.39	0.44	***	0.44	0.46	***
% immigrant	0.11	0.11		0.10	0.08	
Discount rate	0.09	0.03		-0.07	-0.08	
Risk aversion	0.14	0.10		-0.23	-0.18	
Locus of control	-0.05	-0.05		0.08	0.09	
Anxiety	0.09	0.11		-0.19	-0.17	
Self perception	-0.03	-0.05		0.06	0.08	
Self confidence	-0.07	-0.03		0.11	0.06	
Cognitive ability	-0.32	-0.22	**	0.47	0.41	

Notes: Stars indicate whether the means differ significantly: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. In this table, discount rate, risk aversion, locus of control, anxiety, self perception, self confidence and cognitive ability are standardized with mean zero and standard deviation one. Education father and mother are measured on a 7 point scale ranging from 1 primary education to 7 university.

Table A4  
 OLS regressions of seeing a counselor and quality of educational choice on set of variables

	(1) Seeing a Counselor	(2) Seeing a Counselor	(3) Prefers a different field	(4) Prefers a different field
Male	0.0076 (0.0160)	0.0073 (0.0160)	0.0126 (0.0143)	0.0110 (0.0143)
Age=21	0.0007 (0.0466)	0.0005 (0.0466)	-0.1286*** (0.0417)	-0.1243*** (0.0417)
Age=22	-0.0010 (0.0442)	-0.0066 (0.0441)	-0.1666*** (0.0395)	-0.1602*** (0.0395)
Age=23	0.0041 (0.0435)	0.0003 (0.0435)	-0.1399*** (0.0390)	-0.1360*** (0.0389)
Age=24	-0.0263 (0.0435)	-0.0303 (0.0435)	-0.1380*** (0.0389)	-0.1336*** (0.0389)
Age=25	-0.0118 (0.0446)	-0.0113 (0.0445)	-0.1054*** (0.0399)	-0.1023** (0.0398)
Age=26	-0.0171 (0.0464)	-0.0148 (0.0464)	-0.1132*** (0.0415)	-0.1135*** (0.0415)
Age=27	-0.0078 (0.0493)	-0.0103 (0.0492)	-0.1517*** (0.0441)	-0.1494*** (0.0440)
Age=28	-0.0657 (0.0550)	-0.0716 (0.0550)	-0.1437*** (0.0492)	-0.1361*** (0.0492)
Age=29	-0.1387** (0.0643)	-0.1397** (0.0642)	-0.1241** (0.0576)	-0.1214** (0.0575)
Age=30	0.0230 (0.0741)	0.0226 (0.0740)	-0.2706*** (0.0664)	-0.2671*** (0.0662)
Educ father	-0.0007 (0.0042)	-0.0002 (0.0042)	-0.0005 (0.0038)	-0.0011 (0.0038)
Educ mother	-0.0018 (0.0042)	-0.0023 (0.0042)	-0.0049 (0.0037)	-0.0043 (0.0037)
Middle level secondary school	0.0987*** (0.0197)	0.1007*** (0.0198)	0.0402** (0.0176)	0.0347** (0.0177)
High level secondary school	0.1033*** (0.0218)	0.1038*** (0.0218)	0.0311 (0.0195)	0.0280 (0.0195)
Immigrant	-0.0192 (0.0240)	-0.0175 (0.0240)	0.0751*** (0.0215)	0.0733*** (0.0215)
Discount rate	-0.0003 (0.0003)	-0.0016 (0.0012)	-0.0000 (0.0003)	-0.0001 (0.0011)
Risk preference	-0.0000 (0.0002)	-0.0000 (0.0007)	0.0002 (0.0002)	0.0013** (0.0006)
Locus of control	-0.0024 (0.0087)	0.0003 (0.0210)	-0.0089 (0.0078)	-0.0369** (0.0188)
Anxiety	0.0057 (0.0078)	0.1086*** (0.0403)	-0.0204*** (0.0069)	-0.0242 (0.0361)
Self perception	-0.0031 (0.0092)	-0.0174 (0.0128)	-0.0458*** (0.0082)	-0.0320*** (0.0115)
Self confidence	0.0037 (0.0086)	-0.0084 (0.0119)	-0.0150* (0.0077)	0.0031 (0.0107)
Cognitive ability	-0.0016 (0.0037)	-0.0005 (0.0107)	-0.0016 (0.0033)	0.0107 (0.0095)
Discount rate squared		0.0000 (0.0000)		0.0000 (0.0000)
Risk preference squared		0.0000 (0.0000)		-0.0000* (0.0000)
Locus of control squared		-0.0004 (0.0067)		0.0095 (0.0060)
Anxiety squared		-0.0127*** (0.0049)		0.0006 (0.0044)
Self perception squared		-0.0099* (0.0057)		0.0101** (0.0051)
Self confidence squared		-0.0069 (0.0049)		0.0110** (0.0044)
Cognitive ability squared		-0.0002 (0.0014)		-0.0018 (0.0013)
Constant	0.6326*** (0.0578)	0.4635*** (0.0972)	0.3799*** (0.0518)	0.3668*** (0.0869)

Observations	4,191	4,191	4,191	4,191
R-squared	0.012	0.017	0.028	0.035

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Standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A5

OLS estimates of the relationship between study counseling and quality of the educational choice by subgroups

	(1) Women	(2) Men	(3) Low sec educ	(4) Middle sec educ	(5) High sec educ	(6) Parents low	(7) Parents high	(8) Immigrants	(9) Natives
Counseling	-0.0024* (0.0014)	-0.0005 (0.0018)	-0.0005 (0.0021)	-0.0021 (0.0018)	-0.0020 (0.0017)	-0.0063*** (0.0020)	0.0009 (0.0018)	-0.0008 (0.0038)	-0.0016 (0.0011)
Full set of controls	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl
Observations	2,650	1,541	1,080	1,653	1,813	1,277	1,492	413	3,778

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. A full set of controls (see table 7) is included in all regressions.

Table A6

First stage results: the effect of average amount of counseling by students of the same secondary school on individual's counseling by subgroups

	(1) Women	(2) Men	(3) Low sec educ	(4) Middle sec educ	(5) High sec educ	(6) Parents low	(7) Parents high	(8) Immigrants	(9) Natives
Instrument	2.9876*** (0.5613)	2.5983*** (0.7318)	3.5573*** (0.8824)	2.2685*** (0.7087)	2.7725*** (0.6842)	4.2942*** (0.8113)	2.0622*** (0.7513)	1.2490 (1.3989)	2.8864*** (0.4706)
Full set of controls	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl	Incl
Observations	2,650	1,541	1,080	1,653	1,813	1,277	1,492	413	3,778
R-squared	0.035	0.049	0.066	0.031	0.039	0.071	0.038	0.099	0.033

Notes: Standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable "Counseling" is standardized at the school level as described in the data section. "Instrument" is the average amount of counseling by students of the same secondary school. A full set of controls (see table 7) is included in all regressions.

Table A7

The effect of counseling on the quality of the educational choice with interactions for subgroups

	(1) Prefers a different field	(2) Prefers a different field	(3) Prefers a different field	(4) Prefers a different field	(5) Prefers a different field
Counseling	-0.0219* (0.0118)	-0.0110 (0.0139)	-0.0547** (0.0235)	-0.0525** (0.0241)	-0.1145** (0.0461)
Counseling*Male		-0.0302 (0.0218)	-0.0450* (0.0256)	-0.0461* (0.0264)	-0.0573* (0.0305)
Counseling*Middle level secondary school			0.0533 (0.0352)	0.0539 (0.0354)	0.0618 (0.0417)
Counseling*High level secondary school			0.0786** (0.0321)	0.0781** (0.0324)	0.0874** (0.0371)
Counseling*Immigrant				-0.0236 (0.0645)	-0.0038 (0.0731)
Counseling*Educ father					0.0035 (0.0091)
Counseling*Educ mother					0.0133 (0.0106)
Full set of controls	Incl	Incl	Incl	Incl	Incl
Observations	4,191	4,191	4,191	4,191	4,191

Notes: Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Data source: Supplement survey of the 2004 SIS wave. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). Counseling is standardized at the school level as described in the data section. This variable is instrumented with the average amount of counseling by students of the same secondary school. The interaction variables are instrumented by the interaction of the instrument and the sub group variable, e.g. Counseling\*Male is instrumented with the Instrument\*Male, Counseling\*Middle level secondary school is instrumented with the Instrument\*Middle level secondary school, etc. A full set of controls (see table 7) is included in all regressions.

Table A8  
The effect of other measures of guidance on the quality of the educational choice

	Coefficient	t-value
We had lessons about educational choice in school	-0.341	-1.062
People came to talk about their professions	0.031	0.403
I have had personal conversations with a mentor	0.121	0.448
I have spoken with friends about the educational choice	-0.861	-0.652
I have spoken with my parents about the educational choice	0.401	0.154
I made contact with people working or studying in fields I thought were interesting	-0.301	-0.528
We had an educational choice test in school	-0.093	-0.528
We had a lot of documentation about educational choice in school	-0.155	-1.053
I got an educational choice magazine	-0.133	-0.194
I went to a meeting about educational choice in Utrecht	0.076	0.863
I or my parents contacted a professional educational choice agency	-2.941	-0.526
How often did you go to an information day?	-0.097	-1.550

Notes: Data source: Supplement survey of the 2004 SIS wave. Each row shows the result of a separate IV regression. The dependent variable is a dummy variable (0= does not prefer a different field of education in retrospect, 1= prefers a different field of education in retrospect). The variable indicated in the row is the is standardized at the school level as described in the data section. This variable is instrumented with the average of that variable for students in the same secondary school. A full set of controls (see table 7) is included in all regressions.

### Appendix 3

#### Questions used to measure personality and economic preference parameters

##### Time preference

We used the average answer of 3 bundles of questions.

Question 1 reads as follows:

We now offer you a number of choices. Please indicate which alternative you would choose. It is important to know that we are not searching for the right answer. This answer does not exist. We are merely interested in your choices.

a  800 euros now or  1200 euros in one year

*This question is repeated twice where the amounts change depending on the choices made. So:*

b  X euros now or  Y euros in one year

c  X euros now or  Y euros in one year

a	B	c	Resulting discount rate
X = 800 Y = 1200	If X: X = 800 Y = 1400	If X: X = 800 Y = 1500	If X: DR2=94
			If Y: DR2=81
		If Y: X = 800 Y = 1300	If X: DR2=69
			If Y: DR2=56
	If Y: X= 800 Y = 1000	If X: X = 800 Y = 1100	If X: DR2=44
			If Y: DR2=31
		If Y: X = 800 Y = 900	If X: DR2=19
			If Y: DR2=6

Question 2 reads as follows:

What would you choose:

a  800 euros now or  4000 euros in four years

*This question is repeated twice where the amounts change depending on the choices made. So:*

b  X euros now or  Y euros in four years

c  X euros now or  Y euros in four years

a	b	c	Resulting discount rate
X = 1000 Y = 4000	If X: X = 1000 Y = 6500	If X: X = 1000 Y = 8500	If X: DR3=75
			If Y: DR3=65
		If Y: X = 1000 Y = 5000	If X: DR3=55
			If Y: DR3=45
	If Y: X= 1000 Y = 2000	If X: X = 1000 Y = 3000	If X: DR3=37
			If Y: DR3=25
		If Y: X = 1000 Y = 1500	If X: DR3=15
			If Y: DR3=5

Question 3 reads as follows:

What would you choose

a  800 euros in one year or  1200 euros in two years

*This question is repeated twice where the amounts change depending on the choices made. So:*

b  X euros in one year or  Y euros in two years

c  X euros in one year or  Y euros in two years

A	b	c	Resulting discount rate
X = 800 Y = 1200	If X: X = 800 Y = 1400	If X: X = 800 Y = 1500	If X: DR4=94
			If Y: DR4=81
		If Y: X = 800 Y = 1300	If X: DR4=69
			If Y: DR4=56
	If Y: X= 800 Y = 1000	If X: X = 800 Y = 1100	If X: DR4=44
			If Y: DR4=31
		If Y: X = 800 Y = 900	If X: DR4=19
			If Y: DR4=6

## Risk Preference

We used the average answer to 2 bundles of questions

The first question reads:

Please indicate which alternative you would choose.

a  800 euros or  50% chance to get nothing and 50% chance to get 2000 euros

*This question is repeated twice where the amounts change depending on the choices made. So:*

b  X euros or  50% chance to get nothing and 50% chance to get Y euros

c  X euros or  50% chance to get nothing and 50% chance to get Y euros

a	b	c	Resulting risk aversion
X = 800 Y = 2000	If X: X = 800 Y = 2400	If X: X = 800 Y = 2600	If X: RP1=68
			If Y: RP1=56
		If Y: X = 800 Y = 2200	If X: RP1=43
			If Y: RP1=31
	If Y: X= 800 Y = 1600	If X: X = 800 Y = 1800	If X: RP1=18
			If Y: RP1=7
	If Y: X = 800 Y = 1400	If X: RP1=-7	
		If Y: RP1=-18	

Question 2 reads as follows:

What would you choose

a.  100 euros of  90% chance on nothing and 10% chance on 1500 euros

*This question is repeated twice where the amounts change depending on the choices made. So:*

b  X euros or  90% chance to get nothing and 10% chance to get Y euros

c  X euros or  90% chance to get nothing and 10% chance to get Y euros

a	b	c	Resulting risk aversion
X = 100 Y = 1500	If X: X = 100 Y = 2000	If X: X = 100 Y = 2250	If X: RP2=136
			If Y: RP2=112
		If Y: X = 100 Y = 1750	If X: RP2=87
			If Y: RP2=62
	If Y: X= 100 Y = 1000	If X: X = 100 Y = 1250	If X: RP2=37
			If Y: RP2=12
		If Y: X = 100 Y = 750	If X: RP2=-12
			If Y: RP2=-37

### Frederick's (2005) Cognitive Reflection Test

Below there are 8 problems which differ in degree of difficulty. Try to answer as many questions as possible.

1. Together, a ball and a cap cost 1.10 Euros. The ball costs 1.00 Euros more than the cap. How much does the cap cost? \_\_\_\_\_ cents
2. If you toss a fair coin twice, how large is the chance that 'Head' comes up at least once? \_\_\_\_\_ %
3. If 5 machines need 5 minutes to produce 5 things, how long do 100 machines need to make 100 things? \_\_\_\_\_ minutes
4. Two cars are approaching each other in the same lane. Car A drives at a speed of 120 km/h. Car B at 60 km/h. How large is the distance between these two cars one minute before they collide? \_\_\_\_\_ Kilometers
5. In a lake there is a patch of lily pads. Every day the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half the lake? \_\_\_\_\_ days
6. If Timo drinks a bottle of water in 6 days and Esther takes 12 days to finish a bottle, how long does it take before they finish one bottle together? \_\_\_\_\_ dagen (answer=4)
7. If three salesmen can pack six toys in half an hour, how many salesmen would one need to pack 20 toys in one hour? \_\_\_\_\_ salesmen
8. At a match, Bart comes in at the 15<sup>th</sup> place and at the 15<sup>th</sup> last place. How many people participated at the match? \_\_\_\_\_ people

Answers: 5, 75, 5, 3, 47, 4, 5, 29.

## **Personality traits**

We used answers to the following statements to measure personality traits.

Indicate how these statements relate to you on a scale 1: Totally disagree ... 7: Totally agree

### **Locus of Control**

- Set backs are usually due to mistakes people make
- Most people do not realize to what extent their life is determined by coincidences
- Whether I reach targets that I have in my life is not a matter of luck

### **Anxiety**

- I often think about unpleasant events in the past
- I often tend to check whether I did everything right
- I think it is scary to go to places I have never been to

### **Self Perception**

- My opinions about myself seem to change regularly
- In general I have a clear idea about who and what I am
- I often doubt about decisions because I do not know exactly what I want

### **Self Confidence**

- I tend to think someone else is better than I am
- I think I have enough reason to be proud of myself
- The difference between who I am and what I want is large