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# Sorting or mixing? Multi-track and single-track schools and social inequalities in a differentiated educational system

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In the Dutch stratified secondary educational system, schools vary in how many tracks are offered. While the tendency in the Netherlands is for schools to become smaller, a relevant policy question is whether multi-track school settings promote equality of educational opportunity. Comparing single-track schools at the pre-university and pre-vocational levels with multi-track schools offering the same exams, and using relative geographical distance as an instrument of school choice, the analyses showed that single-track pre-university schools enhance the probability of obtaining a pre-university diploma without delay, but more strongly so for students from disadvantaged backgrounds (who have a lower chance of going to such schools). The single-track pre-vocational schools were associated with a lower likelihood of achieving a diploma at a level higher than pre-vocational education. Multi-track schools within a varied system will not automatically enhance equal opportunities, as middle-class children will also benefit from the additional options that multi-track schools provide.

**Keywords:** tracking; educational inequality; differentiation; social class; the Netherlands

## Introduction

Social inequalities produced through differentiation and selection in school systems have received a lot of attention in recent years. Scholars of various fields are engaged with the general question of whether it matters for the magnitude of social inequalities in educational outcomes how children are placed in different school trajectories, and which educational policies are in place for this. On the one side of the debate there are studies highlighting the similarities on patterns of social stratification in education in different educational systems, questioning the relevance of educational policies to affect the level of educational stratification that eventually emerges in society (Boliver

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& Swift, 2011; Bukodi *et al.*, 2014). This literature concludes that stratification patterns are highly similar across contexts. The reason why educational policies matter so little, according to this literature, is that inequalities are mostly produced in families, not in schools. Policies that may be more effective in combating inequalities would then be directed towards the resources families have at their disposal (Breen & Jonsson, 2007).

On the other side of the debate are scholars arguing that the organisation of education, and the policies affecting it, do matter for socioeconomic inequalities in education. With regard to selection and differentiation, it has been shown that early tracking harms equality of opportunities (Hanushek & Wößmann, 2006; Brunello & Checchi, 2007; Van de Werfhorst, 2019). Within tracked systems, standardised rules for the placement of students into tracks promote equality of opportunities (Korthals, 2015; Dollmann, 2016). Policies cannot erase inequality, however, as policies may slightly moderate, but not eliminate, differences in educational outcomes for students of different socioeconomic or migration backgrounds.

Besides comparative work, single-country studies have also been published about selection and sorting rules, with research questions tailored to the specific national case. For England and Wales, for instance, research has examined whether the comprehensive schools that gradually replaced the tracked system during the 1970s promote equality of opportunity, or the reverse question of whether the traditional grammar schools are hindering equal opportunities (Boliver & Swift, 2011; Gorard & Siddiqui, 2018). The results of these studies are mixed, depending on the studied outcome. Gorard & Siddiqui (2018) showed that comprehensive schools reduce between-school segregation and improve performance at the lower end of the performance distribution, while Galindo-Rueda and Vignoles (2004) show that high-ability students have suffered from the comprehensive reform. Boliver & Swift (2011) conclude that the comprehensive reform has not altered the opportunities of children from different social classes to attain higher social class positions themselves. For Hungary, the role of the elite gymnasiums has been studied, which provide the option to leave primary school at age 10, leaving the other students to two or four more years in general education (Horn, 2013). In this way, Hungarian gymnasiums 'skim off' the best students, thereby improving their own students' performance and deteriorating the academic performance of students not entering the gymnasium. For the Netherlands, the effect of mixed-ability secondary schools has been examined for students with a pre-vocational track recommendation from primary school. It was found that mixed-ability schools particularly benefitted high-ability children and children from more advantaged backgrounds (van Elk *et al.*, 2011). A recent study found, furthermore, that enrolment into elite schools in Amsterdam decreased academic performance for students at the lower end of the ability distribution, while girls at the higher end of the distribution benefitted from it (Oosterbeek *et al.*, 2020).

In this article I study the relevance of differentiation within a tracked educational system, that of the Netherlands. While the Dutch system is known to be strongly tracked, schools vary in the number of tracks they offer. When it comes to issues of inequality, single-track and multi-track schools may exacerbate or mitigate socioeconomic inequalities, depending on the track(s) offered, the groups that attend such schools and their effects on educational outcomes. Studying the effectiveness of

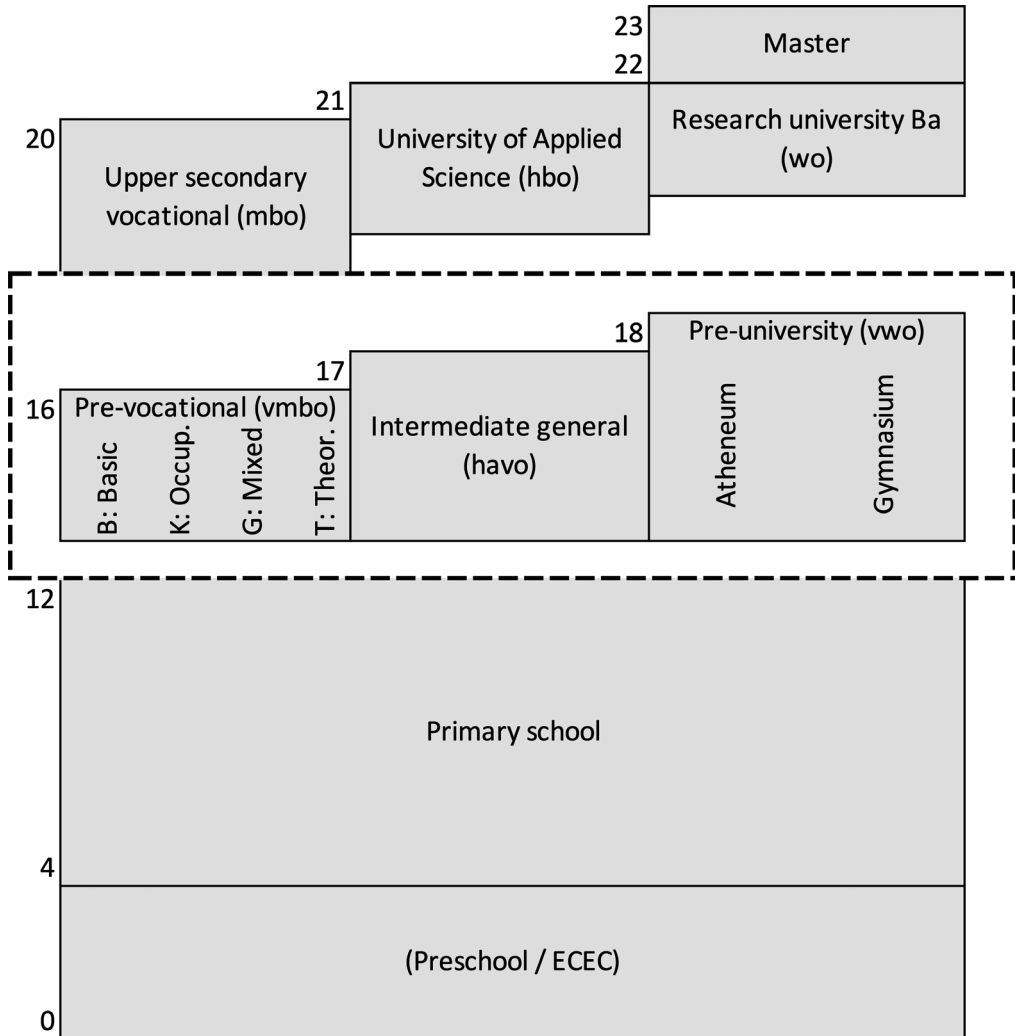
single-track versus multi-track schools helps us to understand the relevance of keeping students of different tracks together in one school environment. As socioeconomic segregation in education is on the rise (Inspectorate of Education, 2018), and rising school segregation is associated with larger gaps in educational achievement (Chmielewski & Reardon, 2016; Holtmann, 2016), a system of single-track schools may lead to larger segregation and stronger gaps in educational attainment compared to a system with multi-track schools with less segregation. Since the Inspectorate of Education (2016) showed that an increasing number of children enter single-track schools, there has been a widely shared public and political concern with the tendency of secondary schools to become smaller, offering fewer tracks. While schools are rather autonomous in the Dutch system, some local governments stimulate schools to offer mixed-track education in the first years of secondary school, thereby hoping to counter the trend. In the national elections of 2017, many political parties campaigned to stimulate multi-track school environments to promote equality of educational opportunity. Also, in the upcoming elections and coalition agreement of 2021, equality of educational opportunity will be an important topic of debate. The Education Council for the Netherlands has recently concluded that differentiation has gone too far in the secondary school system (Onderwijsraad, 2019).

The research question I address is: *To what extent do single-track schools and multi-track schools affect the level of the secondary school diploma that students achieve, and does this effect vary across socioeconomic and migration groups?* By focusing on the role of school offerings in the level of secondary school diploma attained, this study complements other studies that looked at the likelihood of entering high-quality secondary schools in the transition from primary to secondary schools (Burgess & Briggs, 2010).

Studying the effectiveness of academically heterogeneous (i.e. multi-track) versus homogeneous (i.e. single-track) schools is not easy, as there is potentially endogeneity of school choice based on school performance or expectations. This endogeneity has also plagued English studies on the effectiveness of the grammar school (Lu, 2020). Causal effects are important to demonstrate though. A Flemish (Belgian) study showed that (later) track differences in students' attitudinal and behavioural outcomes are already seen in primary school (Boone & Demanet, 2020). I use a design where the (relative) geographical distance to the nearest school of a certain type is used as an instrument of school choice, allowing us to interpret the effects of school type as causal under some assumptions. Knowledge of the potentially heterogeneous effects of going to single-track schools informs us whether the sorting process in Dutch schools optimises learning outcomes and/or reflects cultural boundary-making between social groups.

### **The Dutch educational system: early selection and standardisation**

Figure 1 provides a schematic overview of the Dutch educational system.<sup>1</sup> A major transition in the educational career takes place at age 12, from primary to secondary school (dotted square). At this transition, children enter a tracked system, by enrolling in one of the pre-vocational tracks (*vmbo*): the *havo* track (intermediate general) or the *vwo* track (university preparatory). The university preparatory track comes in



Note: the numbers refer to the typical ages at which programmes start and finish

Figure 1. The Dutch educational system

two forms, *atheneum* and *gymnasium*, in which the gymnasiums offer classical languages (Latin and old Greek).

Schools vary in the number of tracks they offer. Some schools offer only one track (such as schools that offer only the pre-vocational options, or schools that offer only the university preparatory track in elite gymnasiums). Other schools offer multiple tracks, combining for instance *havo* and *vwo*, *vmbo* and *havo*, or *vmbo*, *havo* and *vwo*. It is up to the school to decide which tracks they offer, as a consequence of the free school choice model in the Dutch educational system, laid down in Article 23 of the Dutch Constitution in 1917.

The transition from primary to secondary school is highly standardised. Standardised tests are used as a source of information for the formal recommendation the primary school gives. The recommendation is, *de facto*, close to binding; secondary

schools open the tracks they offer only to students who have at least that level of recommendation. The allocation process is usually governed at the municipal level. The recommendation deviates from the standardised test results in a systematic manner with regard to the background of the children; children of high-income and non-migrant families more often receive higher recommendations than expected on the basis of the test scores than students of low-income and migration backgrounds (Inspectorate of Education, 2016). Standardisation of ‘output’ is also strong in secondary education, in particular in the nationally standardised final school examinations (at *vmbo*, *havo* or *vwo* level).

Figure 2 shows the schooling process that I study in the current article. In the school year 2010–2011, students are in the final year of primary school. From this year we obtain information about student sex and parental background, the standardised school test at the end of primary school and the track recommendation the primary school teachers gave. Then, in the next school year, it is recorded which secondary school the students attended, and we can assess which tracks the school location offers and which tracks the students are enrolled in. Finally, across the years 2014–2015, 2015–2016 and 2016–2017, we determine the (highest) exam level that students completed. As this means that we have 6 years of secondary school data, we assess the achievement of the pre-university (*vwo*) exam only without delay, while the other exams can be achieved with some delay (as *havo* [intermediate general] takes 5 years and *vmbo* [pre-vocational] 4 years to complete in nominal years).

### Theoretical background between institutions and mechanisms

In order to understand socioeconomic inequalities in education, we follow an approach that connects microlevel mechanisms with institutional contexts (Erikson & Jonsson, 1996; Lucas, 2001; Barone, 2019). This approach assumes that advantaged families act strategically to enhance their children’s educational careers and employ resources towards this aim. However, processes in families and schools do not work

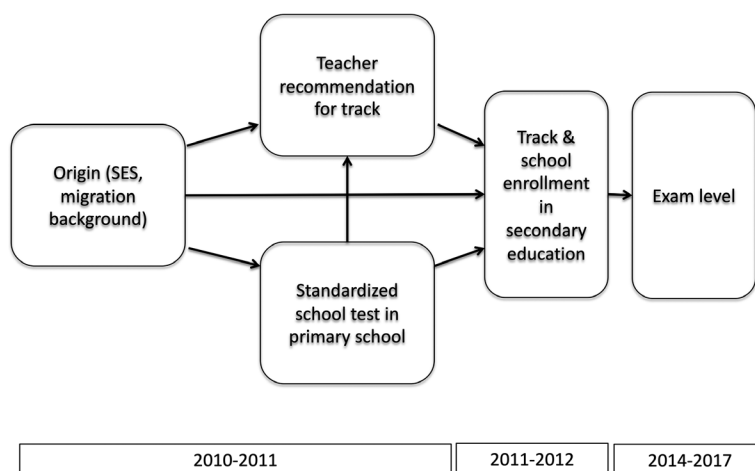


Figure 2. The educational process studied

in vacuum but are related to the institutional context in which parents, children and teachers perform their social actions. Institutions, described by Bowles (2004: 47–48) as the ‘laws, informal rules and conventions that give a durable structure to social interactions among the members of a population’, can make it easier or harder for well-educated parents to hoard opportunities for their children. Opportunity hoarding as a form of social closure may lead to the active creation and maintenance of boundaries between groups (Tomaskovic-Devey and Avent-Holt, 2019), of which tracking practices in education are a clear example (Lucas, 1999; Domina *et al.*, 2019). Moreover, speaking to the partly informal character of institutions, norms may exist of what defines a ‘good education’ in different social groups.

It is useful to make a distinction between theories predicting rational-functional and cultural boundary processes in schools. Rational-functional processes imply that the sorting of students is intended to optimise learning. Ability grouping improves academic performance because homogeneous classes benefit everybody according to this perspective. The rational-functional model emphasises efficient learning because the placement of students into schools follows a Pareto optimum; there is no other distribution of students across schools that would benefit one student while not hurting another. This Pareto optimum is not easy to achieve in real life. There are indications that selection and sorting help the performance of high-ability students (Galindo-Rueda & Vignoles, 2004; Domina *et al.*, 2019), although cross-nationally comparative work shows no higher *average* performances in educational systems with more academic homogeneity (Brown *et al.*, 2007). Reasons why some students are harmed by sorting and selection are, first, that teachers are unable to adapt their teaching methods to the specific needs of low-ability classes (Gamoran, 1992) and, second, that resources are unequally distributed across schools (Brunello & Checchi, 2007).

Cultural processes are aimed at creating boundaries also for reasons unrelated to efficient sorting. Following this perspective, schools are ‘sorting machines’ that not only sort to optimise learning. Rather, school sorting and tracking practices also ‘construct and reinforce highly salient social categories’ that reproduce inequalities (Domina *et al.*, 2017: 312). Congruent with the more general cultural sociological perspective on the creation of categories, educational institutions help to create and maintain boundaries between social groups by means of categorisation, labelling and identification. Such processes are not entirely driven by rational-functional motivations about the optimisation of student learning (Lamont *et al.*, 2014; Domina *et al.*, 2017). The cultural processes can also become ‘real’ when factors that were initially used as arbitrary boundaries of closure turn into realistically appreciated measures of achievement (Lamont, 2012).

Importantly, the rational-functional and cultural boundary theories can be predictive for both the sorting process into schools and the learning process once children are in a school. In theory, the sorting process could follow boundary-making processes (e.g. when advantaged families prefer to sort into single-track pre-university schools, or disadvantaged families are more strongly oriented to pre-vocational education), while the learning process works according to the rational-functional model once students are inside. Or the reverse could also be true: the sorting process could work fully based on rational-functional considerations, while the learning process

partly follows cultural boundary-making (e.g. when the school culture at one particular school fits one social class better than it does another). The sorting into schools and learning inside schools can theoretically also follow the same model.

The distinction in the two theories does not imply that it is irrational for parents to culturally prefer certain forms of education. Actions like considering the probability of success, and intergenerationally maintaining the social position, can be seen as part of a rational action framework (e.g. Breen & Goldthorpe, 1997), even if the family's educational strategy is to emphasise and create boundaries between groups by doing so.

It is likely that going to a single-track pre-university school benefits children in terms of likelihood of obtaining a pre-university diploma, even among the homogeneous group of students with a unitary pre-university teacher recommendation and similar achievement scores. Once students are inside a school, schools and students alike will try to make it work. Schools do not want to lose students, as the Inspectorate judges schools on downstreaming (i.e. students moving to a less demanding track while in secondary school), and students are willing to stay in school in order to avoid having to adjust to a new school, and to avoid losing friends. If, in contrast, lower tracks would also be available at the same school, it is likely that, in the case of a drop in performance, students will downstream to a lower track some time during the programme. Our first hypothesis is that there is a positive effect of going to a pre-university single-track school (as opposed to a multi-track school) based on the likelihood of obtaining the pre-university diploma without delay (*hypothesis 1*).

Single-track pre-university schools are likely valued by children coming from advantaged backgrounds. The cultural preference for single-track pre-university schools will possibly not only make children from advantaged backgrounds more likely to enrol in such schools but may also benefit them more than other students, once they are inside. If the culture found in elite gymnasiums fits better with the home culture, it may be easier to be successful in such environments. If the cultural theory of boundary-making adequately describes what happens within the secondary schools attended, it would then be expected that children of advantaged backgrounds (higher income groups, parents with academic degrees and non-migrants) will reap a greater benefit from going to the single-track pre-university schools. Disadvantaged children, by contrast, may be more likely to experience delays, or downstream to other schools, because they feel alienated in the elite school context through a lack of cultural capital. Thus, the cultural boundary approach predicts that the positive effect of going to the single-track pre-university schools is greater for advantaged children than for disadvantaged children (*hypothesis 2a*).

If, however, schools function mostly according to the rational-functional theory once students are inside, the positive effects of the single-track pre-university schools are independent of student background, at least among the homogeneous group of students with a unitary pre-university recommendation and similar scholastic achievements. Students get efficiently educated within their track, and all students benefit equally. It could even be the case that students from disadvantaged backgrounds reap greater benefits from going to the single-track pre-university schools, as they depend more on the (in this case rational-functional) school context for their learning. Thus, from the rational-functional model of school learning we would



expect that the positive effect of single-track pre-university schools is homogeneous by student background, or even greater for disadvantaged children (*hypothesis 2b*).

Single-track pre-vocational schools may harm the opportunities for reaching a diploma at the intermediate general level (*havo*). Once a student is placed in a pre-vocational school, opportunities are limited to maximise learning if performance is better than initially thought. So, the general hypothesis is that offering pre-vocational education in a multi-track school enhances the likelihood of obtaining an intermediate general (*havo*) exam relative to a single-track pre-vocational school (*hypothesis 3*).

Following the cultural boundary perspective, children from advantaged backgrounds may suffer more from going to a single-track pre-vocational school in terms of likelihood of obtaining a higher-level diploma. Their cultural preferences may make them more likely to move upwards if they went to a multi-track school. They are also more likely to enter the intermediate general (*havo*) programme after finishing the pre-vocational school, which will be enabled by multi-track schools, rather than going to the upper-secondary vocational *mbo* colleges. Children from disadvantaged backgrounds are held back less by single-track pre-vocational schools under the cultural allocation model, as their limited amount of cultural capital would not have helped them into higher tracks even if they were available. So, from the cultural boundary theory it is expected that children from advantaged backgrounds are harmed more than students from disadvantaged backgrounds by single-track pre-vocational schools (*hypothesis 4a*). In other words, children from advantaged backgrounds with a pre-vocational school recommendation benefit more from multi-track schools in reaching a higher-level diploma.

Similar to single-track pre-university schools, the rational-functional model assumes that everybody benefits equally from multi-track school environments (or suffers equally from single-track pre-vocational schools) to reach the higher-level *havo* diploma (*hypothesis 4b*).

## Research design

### *Data*

In the past years a new longitudinal education database has been constructed based on register data: the NCO (*Nationaal Cohortonderzoek Onderwijs*, or National Cohort Study Educational Careers). The NCO replaced school cohort data based on samples of schools that have been collected nationally in the Netherlands since the 1960s. The NCO assesses detailed information on school careers of the full population, including test scores on national tests at the end of primary school, the formalised teacher recommendation for secondary school type, the yearly monitoring of the track and grade enrolled in secondary school, and results on nationally standardised exams at the end of secondary school. Furthermore, individual-level data are merged on parental income and wealth based on tax registers, and on parental education (this latter variable was not in the NCO environment but taken from other registers). The whole school careers of all cohorts are brought together in the NCO environment, from primary to higher education. In this article I use the primary school exit cohort of 2010, consisting of 187,558 students who finished primary school in the 2010–2011 school

year.<sup>2</sup> This cohort is then followed through the year 2016–2017, meaning that we have full secondary school careers till the end of the sixth year.

### *Variables*

The dependent variables for this study concern the *level of examination in secondary school* after 6 years of secondary education. For the two types of single-track schools, a different exam level is analysed. For the effect of the single-track pre-university school, we estimate the probability of obtaining the pre-university diploma (*vwo*). Given the 6-year time window, this implies that we analyse the probability of obtaining the *vwo* diploma without delay. For the single-track pre-vocational school, we analyse the chance of getting a higher diploma than *vmbo* (*havo* or *vwo*) within the 6 years of observation.

In the Dutch educational system, the allocation process to secondary school is highly standardised. Two types of information are highly influential on the options that a child has: the *standardised primary school test* and the *teacher recommendation* (informed, but not fully determined, by the national test). Both variables are included in Z-standardised form in the analysis. Not all children have received a teacher recommendation (92.4% of the NCO cohort did). The recommendations included 32 detailed categories, which are unitary track or mixed (multi-track) recommendations. Furthermore, for the cohort under study, it was not compulsory for a school to take part in a national test, and schools could also choose among several suppliers of their own test. We have restricted the analysis to schools that took part in the Cito test, which covers 73% of the students in the cohort that I study.<sup>3</sup>

Socioeconomic background is measured using two indicators: parental education and household income. The education of parents is not included in the NCO data, but CBS maintains a file HOOGSTEOPLTAB that fills in the highest completed level of education for the Dutch population from various sources. Given that there is also a parent–child file KINDOUDERTAB that identifies father–child and mother–child matches, we can identify the highest completed educational levels of the fathers and mothers of the NCO cohort. Because the registration of higher education degrees is the most complete, we identify whether any of the *parents have obtained a bachelor's degree or higher* (in the Netherlands). This includes bachelor degrees from research universities and universities of applied science.

*Household income* is measured in quintiles of the distribution within the NCO cohort. We furthermore control for the level of *urbanisation* of the students' place of residence, with a dummy identifying students living in cities of 150,000 inhabitants or more.

### *Measuring school distance*

As definition of a school I use *location*. School locations are typically seen as separate schools by the students and their parents. For each school location within a 20-km radius from the six-digit postcode of the student's home address,<sup>4</sup> we can identify which school tracks are offered. Given that distance to a particular type of school is potentially correlated with unobserved confounders that may also correlate with the

outcome variable, we follow the suggestion of McClellan *et al.*, (1994) to take the difference between two distances, in our case the distance to the school type under consideration and the typical alternative school type for the student. To calculate the relative distances, school types that were not available within 20 km were assumed to be 20 km away.

A single-track pre-university school is defined as a school location where all first-year students are enrolled at the pre-university track (*vwo*). Forty-seven such school locations are found in the data, a few more than the 41 classical gymnasiums that exist in the Netherlands.<sup>5</sup> The distance to the nearest single-track elite pre-university school is compared to the distance to a school where the pre-university track is offered in any combination with other tracks (multi-track '*vwo-plus*' schools).

The same was done for schools that only offer pre-vocational education (*vmbo*). There are 292 school locations in the data, at which all first-year students are registered in the pre-vocational *vmbo* track (all *vmbo* tracks). The distance to the nearest single-track pre-vocational school is compared to the distance to the nearest school that offers, besides *vmbo*, also one or more other track(s) (multi-track '*vmbo-plus*' schools).

Figure 3 shows the relative distances used. It is clear that, for most students, the distance to a single-track academic school is greater than the distance to a school offering the same pre-university exam in a multi-track school constellation. The distances to a single-track pre-vocational school and a broad '*multi-track vmbo-plus*' school are much more similar for students, seen by the much smaller dispersion around the relative distance of 0. With regard to pre-vocational education, there is no clear pattern of which type of school is closer to the average student, a single-track or multi-track school.

In total, we can use 126,825 students in our analyses. Table 1 shows the results of one-sample *t*-tests on the differences between the included sample and the population with regard to the predictors of the models. Differences in the mean scores are very small, although there is a small upward bias in socioeconomic background. The differences are small (the significance of *t*-tests is driven by the sample size, which is large).

The slightly biased analytical sample was accounted for by weighting the data by the inverse of the likelihood to be observed in the analytical sample, based on a model with predictors of parents' degree, income quintile, migration origin group, living in a large city and primary school test score (Seaman & White, 2013). The results with and without these weights are almost identical.

### *The empirical approach*

A first step is to investigate the selection process into single-track schools, both of pre-university and pre-vocational type. Using the Karlson, Holm and Breen (KHB) method, I analyse to what extent social differences in the likelihood of enrolling in both types of school are mediated by the primary school test and the teacher recommendation level (Karlson *et al.*, 2012). This descriptive exercise tells us to what extent there are unexplained differences by socioeconomic and migration background, after holding constant for academic drivers of school track. While such remaining gaps

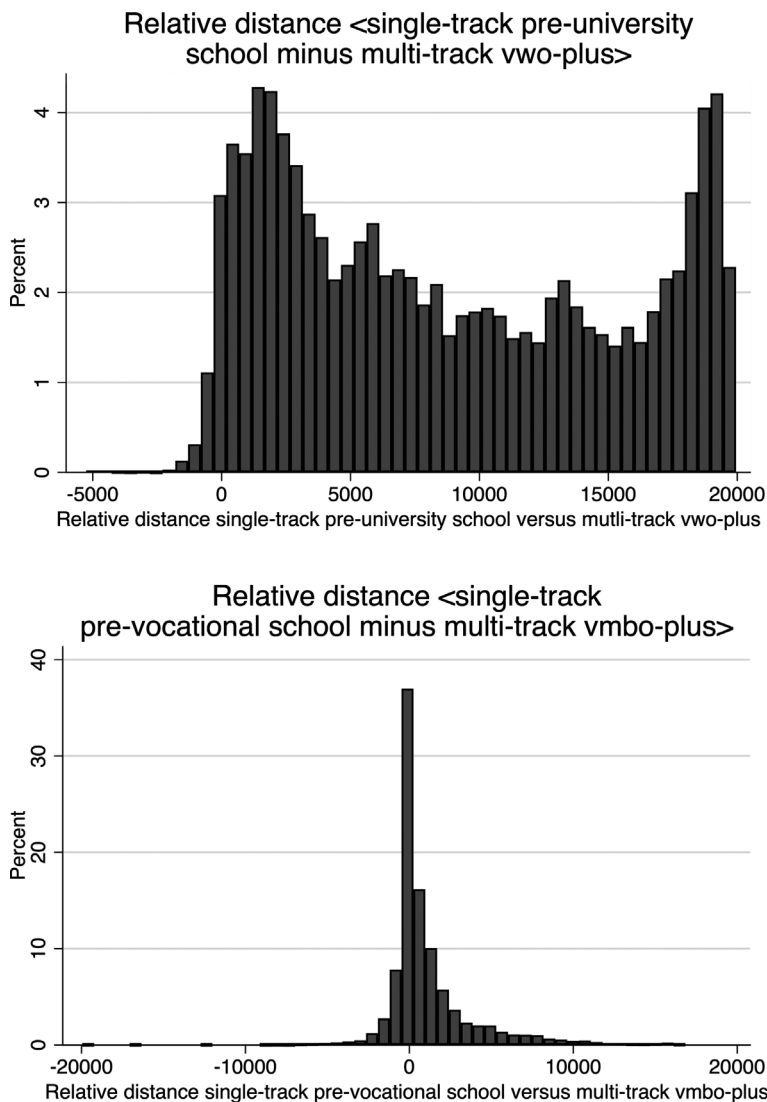


Figure 3. Relative distances to different school offerings

may indicate cultural preferences, part of the cultural preferences can already have affected the primary school test. Similarly, if cultural differences drive school choice processes, it is likely that children of less advantaged backgrounds are more likely to enrol in single-track pre-vocational schools, even after holding constant for school performance and teacher recommendation.

Then, to assess the causal effect of enrolling in single-track schools, instrumental variables (IV) regression models are employed. IV models identify, under some assumptions discussed below, the causal effect of an  $X$  variable (single-track school) on a  $Y$  variable (probability of obtaining a diploma within 6 years) by instrumenting (i.e. regressing)  $X$  on an exogenous variable  $Z$  (Angrist *et al.*, 1996). By regressing  $X$  on  $Z$ , and replacing  $X$  with the predicted score on  $X$  (which is  $\hat{X}$ ) from this first-stage

Table 1. Descriptive statistics for the population and the analytical sample

|  | Population |                 | Analytical sample (N = 126,825) |          |          |         |         |
|--|------------|-----------------|---------------------------------|----------|----------|---------|---------|
|  | size       | Population mean | t-test of difference in mean    | Mean     | St. dev. | Minimum | Maximum |
| Female   | 187,558    | 0.499           | 3.501***                        | 0.504    | 0.5      | 0       | 1       |
| Standardised primary school test   | 137,013    | 0               | 1.417                           | 0.004    | 1        | -1.919  | 1.852   |
| School recommendation  | 173,372    | 0               | 30.508***                       | 0.081    | 0.951    | -2.562  | 1.241   |
| Non-western  | 187,558    | 0.151           | -1.815~                         | 0.149    | 0.356    | 0       | 1       |
| Household income quintile  | 186,965    | 2.979           | 10.303***                       | 3.02     | 1.408    | 1       | 5       |
| At least one parent has degree   | 187,558    | 0.136           | 2.898**                         | 0.139    | 0.345    | 0       | 1       |
| Large city   | 187,558    | 0.192           | 14.290***                       | 0.208    | 0.406    | 0       | 1       |
| Difference in distance to single-track pre-university and <i>ezwo</i> -plus school | 187,558    | 8853.448        | -1.422                          | 8827.487 | 6500.107 | -5,255  | 19,953  |
| Difference in distance to single-track prevocational and <i>embo</i> -plus school  | 187,558    | 1110.301        | 6.027***                        | 1155.525 | 2672.117 | -19,953 | 16,839  |

~  $p < 0.10$ .  
 \*  $p < 0.05$ .  
 \*\*  $p < 0.01$ .  
 \*\*\*  $p < 0.001$ .

regression in the second stage predicting  $Y$ , the model exploits the fact that the error term of the first-stage regression is uncorrelated with  $X$ . The model identifies the causal effect of single-track schools on the probability of obtaining a diploma if the likelihood of obtaining the diploma is dependent on the instrument  $Z$  only through the relationship between  $Z$  and  $X$ .

As an instrument, I use the relative distance measure for being enrolled in a single-track pre-university or single-track pre-vocational school. This is done by subgroup indicating different levels of social (dis-)advantage. The same models were estimated using ordinary least squares, mainly to inspect the difference from the IV estimation.

In the IV model, I estimate the likelihood that students choose the particular school type given the scores on independent variables and the difference in distance. The instrument works well if the relative distance is associated with enrolment into a particular school (e.g. the likelihood of enrolling in a single-track elite academic school is larger if such a school is closer by relative to a school that offers the same academic exam but in a multi-track constellation). The model further assumes that the relative distance is not correlated with the likelihood of obtaining a diploma, other than through the likelihood of being enrolled in that school type.

Because we study two different single-track school types, we have two versions of the same model. Formally, the first-stage Equations (1) and (3) estimate the likelihood of being in a particular school type, and the second-stage Equations (2) and (4) impute the predicted score of the first stage into the model predicting the likelihood of obtaining a particular exam level (all using linear probability models). As the residuals in the first-stage equations are uncorrelated with the predictors and the outcome, predicted school type is no longer confounded with unobservables that may correlate with the likelihood of being enrolled in the school type under consideration. I use the general methods of moments (GMM) estimation with the Stata 15 package `ivreg2`. All analyses are clustered by primary school (robust standard errors):

$$p(\text{single track } vwo) = \alpha + \beta X + \beta(\text{distance}_{\text{single track } vwo} - \text{distance}_{\text{multi track } vwo\text{plus}}) \quad (1)$$

$$p(vwo \text{ diploma}) = \alpha + \beta X + \beta \widehat{\text{single track } vwo} \quad (2)$$

$$p(\text{single track } vmb) = \alpha + \beta X + \beta(\text{distance}_{\text{single track } vmb} - \text{distance}_{\text{multi track } vmb\text{plus}}) \quad (3)$$

$$p(havo \text{ diploma}) = \alpha + \beta X + \beta \widehat{\text{single track } vmb} \quad (4)$$

Note further that the IV estimates in this article are to be interpreted as local average treatment effects (LATE; Blundell *et al.*, 2005). That is, the model identifies the causal effect of the particular school type for compliers—those whose school choice was affected by the relative distance.

Important assumptions of the IV model are that the instrument is relevant (i.e. predicting the ‘treatment’ of being in a particular type of school), there is exclusion restriction (the effect of the IV school distance on attained diploma only runs through the treatment ‘single-track school’) and there is ignorable treatment assignment (the single-track ‘treatment’ is not strongly related to other predictors of attainment)

(Angrist *et al.*, 1996). The F-tests for the first-stage regression inform us about the relevance assumption. These are reported below, and lead us to conclude that the instruments are reasonably strong. The exclusion restriction assumption cannot directly be tested, but OLS models are shown to test whether there is a direct association between the relative distance measure and educational attainment, controlling for school type. Especially with regard to the model studying the effect of single-track pre-university schools there is no such direct effect, adding credence to the IV estimation.

The ignorability assumption is tested by regressing the relative distance measures on the predictors of the model. Table 2 shows the results of this analysis. Keeping in mind that we have large population-level datasets, it is more important to examine the effect sizes than statistical significance. The relative distance to single-track pre-university schools is only weakly related to socioeconomic status (SES) indicators. For the highest income category, the difference in distance to single-track pre-university schools and pre-university tracks in multi-track schools is around 800 m less than for the poorest income group. Children of university-educated parents have a relative distance of less than 500 m to the advantage of single-track pre-university schools. Migration background is more strongly correlated with relative distance, with 1–2 km more to the advantage of single-track pre-university schools relative to natives. Importantly, the standardised primary school test is not correlated with the relative distance to single-track pre-university (*vwo*) schools. Urban environments do make the difference smaller, to the advantage of single-track pre-university schools (roughly 4,600 m less difference than in rural areas). Note that for none of the subgroups do these models predict that single-track pre-university schools are closer by than pre-university tracks in multi-track schools (given the intercept of around 9,500 m, indicating that native boys with average test score coming from low-SES backgrounds outside the big cities live 9,500 m closer by to a broad *vwo*-track school than to a single-track pre-university school). For the relative distance to the single-track pre-vocational (*vmbo*) schools, the background variables are only weakly predictive.

All in all, we cannot strictly assume that the treatment is randomly assigned independent of other predictor variables, but in terms of effect sizes it is unlikely that a few hundred metres difference matters much for school choice.

## Results

### *Sorting into single-track schools*

Table 3 shows logit coefficients, made comparable across models using the KHB method, of entering the pre-university single-track school and the pre-vocational single-track school. This is done for two subsets of students for each type of school in terms of their primary school recommendation, similar to what will be done in the IV models to study causal effects. For the pre-university school, I do this for students with a unitary pre-university track recommendation (*vwo*) and for students with a unitary and a mixed pre-university/intermediate general recommendation (*vwo* and *havo/vwo*). For the pre-vocational school, this is done for students with a unitary pre-vocational track recommendation (*vmbo*), and separately for students with a mixed

Table 2. OLS regression of relative distance on student background variables

|   | -1  | -2   | -3   | -4  |
|---|---|--|--|---|
|   | Relative distance to single-track<br><i>vwo</i> |  | Relative distance to single-track<br><i>vmbo</i> |   |
|   | <i>vwo</i><br>recommen-<br>dation<br>only       | <i>vwo</i> and<br>mixed<br><i>havo/vwo</i><br>recommendation | <i>vmbo</i><br>recommendation                    | <i>vmbo/havo</i><br>mixed<br>recommendation |
| Female  | 102.1<br>(86.3)                                 | 14.77<br>(65.9)  | 12.14<br>(25.3)                                  | -59.23<br>(47.9)                            |
| Standardised primary<br>school test           | -7.561<br>(138.8)                               | -290.4**<br>(100.2)  | 32.48<br>(36.0)                                  | -29.33<br>(62.7)                            |
| Migration background                          |   |  |  |   |
| No migration<br>background                    | ref   | ref  | ref  | ref   |
| Moroccan origin                               | -2,132.7***<br>(379.1)                          | -2,185.8***<br>(298.6)                                       | -557.9***<br>(56.0)                              | -466.4***<br>(105.4)                        |
| Turkish origin                                | -1,290.5***<br>(489.9)                          | -940.0**<br>(360.3)  | -434.3***<br>(70.2)                              | -144.2<br>(147.0)                           |
| Caribbean origin                              | -1,269.7***<br>(265.2)                          | -1,585.4***<br>(210.9)                                       | -368.9***<br>(55.3)                              | -209.5<br>(107.3)                           |
| Other non-western<br>origin                   | -866.7***<br>(232.1)                            | -1,024.4***<br>(182.1)                                       | -249.9***<br>(57.2)                              | -313.8***<br>(94.0)                         |
| Other western origin                          | -968.6***<br>(166.1)                            | -971.0***<br>(140.0)   | 63.07<br>(73.5)                                  | 148.4<br>(117.5)                            |
| Household income quintile                     |   |  |  |   |
| Household income<br>quintile 1 (lowest)       | ref   | ref  | ref  | ref   |
| Household income<br>quintile 2                | 578.3**<br>(177.0)                              | 467.3***<br>(127.2)  | 109.6**<br>(35.9)                                | 58.79<br>(77.1)                             |
| Household income<br>quintile 3                | 530.9**<br>(176.9)                              | 374.4**<br>(128.7)   | 88.28*<br>(42.4)                                 | 65.27<br>(78.4)                             |
| Household income<br>quintile 4                | -27.2<br>(172.0)                                | -101.8<br>(129.9)  | 102.7*<br>(44.8)                                 | -77.84<br>(81.0)                            |
| Household income<br>quintile 5 (highest)      | -864.3***<br>(173.6)                            | -944.3***<br>(133.6)   | -29.02<br>(57.1)                                 | -125.5<br>(85.3)                            |
| At least one parent with<br>university degree | -491.0***<br>(102.7)                            | -492.6***<br>(82.6)  | -57.91<br>(47.0)                                 | -72.29<br>(65.7)                            |
| Large city > 150,000                          | -4,644.6***<br>(315.2)                          | -4,998.1***<br>(289.6)                                       | -812.0***<br>(68.6)                              | -960.7***<br>(86.5)                         |
| Constant                                      | 9484.5***<br>(258.2)                            | 10315.4***<br>(192.0)  | 1392.5***<br>(69.5)                              | 1522.4***<br>(92.1)                         |
| N   | 22,622  | 40,332   | 51,250   | 13,853                                      |

~ $p < 0.10$ .\* $p < 0.05$ .\*\* $p < 0.01$ .\*\*\* $p < 0.001$ .



Table 3. Mediation analysis of enrolment into single-track pre-university and single-track pre-vocational school (KHB method)

|   |         | Single-track pre-university school  |       |   |        | Single-track pre-vocational school |     |   |       |      |        |       |     |
|---|---------|-------------------------------------|-------|---|--------|------------------------------------|-----|---|-------|------|--------|-------|-----|
|   |         | <i>vvvo</i> recommendation only (a) |       | <i>havvo</i> and mixed <i>havvo/vvvo</i> recommendation (b) |        | <i>vmbvo</i> recommendation (b)    |     | <i>vmbvo/havvo</i> mixed recommendation (b) |       |      |        |       |     |
|   |         | b                                   | s.e.  | sig   | b      | s.e.                               | sig | b   | s.e.  | sig  |        |       |     |
| At least one parent with university degree            | Reduced | 0.305                               | 0.040 | ***   | 0.467  | 0.038                              | *** | -0.191                                      | 0.040 | ***  | -0.034 | 0.119 |     |
|   | Full    | 0.291                               | 0.040 | ***   | 0.306  | 0.038                              | *** | -0.074                                      | 0.040 | ~    | -0.043 | 0.119 |     |
|   | Diff    | 0.015                               | 0.054 |   | 0.161  | 0.118                              |     | -0.117                                      | 0.026 | ***  | 0.009  | 0.026 |     |
| Household income quintile (ref. 1st quintile: lowest) | Reduced | -0.233                              | 0.076 | **  | -0.182 | 0.071                              | *   | -0.080                                      | 0.029 | **   | -0.215 | 0.104 | *   |
|   | Full    | -0.247                              | 0.076 | ***   | -0.237 | 0.071                              | *** | -0.048                                      | 0.029 | ~    | -0.204 | 0.104 | *   |
|   | Diff    | 0.014                               | 0.054 |   | 0.055  | 0.118                              |     | -0.032                                      | 0.026 |      | -0.010 | 0.026 |     |
| Quintile 3  | Reduced | -0.102                              | 0.075 |   | -0.028 | 0.071                              |     | -0.164                                      | 0.032 | ***  | -0.438 | 0.114 | *** |
|   | Full    | -0.151                              | 0.075 | *   | -0.166 | 0.071                              | *   | -0.089                                      | 0.032 | **** | -0.440 | 0.114 | *** |
|   | Diff    | 0.049                               | 0.054 |   | 0.138  | 0.118                              |     | -0.075                                      | 0.026 |      | 0.002  | 0.026 |     |
| Quintile 4  | Reduced | 0.014                               | 0.069 |   | 0.199  | 0.066                              | **  | -0.217                                      | 0.036 | ***  | -0.428 | 0.118 | *** |
|   | Full    | -0.042                              | 0.070 |   | -0.034 | 0.066                              |     | -0.098                                      | 0.035 | **   | -0.426 | 0.118 | *** |
|   | Diff    | 0.056                               | 0.055 |   | 0.233  | 0.118                              | *   | -0.119                                      | 0.026 | ***  | -0.002 | 0.026 |     |
| Quintile 5 (highest)                                  | Reduced | 0.457                               | 0.069 | ***   | 0.783  | 0.066                              | *** | -0.323                                      | 0.042 | ***  | -0.343 | 0.135 | *   |
|   | Full    | 0.385                               | 0.070 | ***   | 0.386  | 0.065                              | *** | -0.178                                      | 0.041 | ***  | -0.338 | 0.134 | *   |
|   | Diff    | 0.072                               | 0.055 |   | 0.398  | 0.119                              | *** | -0.144                                      | 0.026 | ***  | -0.004 | 0.026 |     |
| Migration background (ref. no migration background)   | Reduced | 0.351                               | 0.172 | *   | 0.021  | 0.156                              |     | 0.217                                       | 0.061 | ***  | 0.017  | 0.220 |     |
|   | Full    | 0.451                               | 0.172 | **  | 0.461  | 0.156                              | **  | 0.108                                       | 0.061 | ~    | 0.009  | 0.220 |     |
|   | Diff    | -0.100                              | 0.055 | ~   | -0.440 | 0.119                              | *** | 0.109                                       | 0.026 | ***  | 0.008  | 0.026 |     |
| Turkish origin  | Reduced | 0.260                               | 0.180 |   | -0.068 | 0.165                              |     | 0.062                                       | 0.060 |      | 0.141  | 0.229 |     |
|   | Full    | 0.378                               | 0.180 | *   | 0.425  | 0.165                              | **  | -0.064                                      | 0.060 |      | 0.112  | 0.229 |     |
|   | Diff    | -0.117                              | 0.055 | *   | -0.493 | 0.119                              | *** | 0.126                                       | 0.026 | ***  | 0.030  | 0.027 |     |

Table 3. (Continued)

|                          |         | Single-track pre-university school |       |  |        | Single-track pre-vocational school |     |  |       |     |
|--------------------------|---------|------------------------------------|-------|--|--------|------------------------------------|-----|--|-------|-----|
|                          |         | <i>vwo</i> recommendation only (a) |       | <i>havo</i> and mixed <i>havo/vwo</i> recommendation (b) |        | <i>vmb</i> recommendation (b)      |     | <i>vmbol/havo</i> mixed recommendation (b) |       |     |
|                          |         | b                                  | s.e.  | sig  | b      | s.e.                               | sig | b  | s.e.  | sig |
| Caribbean origin         | Reduced | 0.264                              | 0.117 | *  | 0.151  | 0.112                              |     | -0.020                                     | 0.056 |     |
|                          | Full    | 0.336                              | 0.117 | **   | 0.296  | 0.112                              | **  | -0.115                                     | 0.056 | *   |
|                          | Diff    | -0.071                             | 0.055 |  | -0.145 | 0.118                              |     | 0.095                                      | 0.026 | *** |
| Other non-western origin | Reduced | 0.308                              | 0.090 | ***  | 0.341  | 0.085                              | *** | -0.173                                     | 0.053 | *** |
|                          | Full    | 0.325                              | 0.090 | ***  | 0.361  | 0.085                              | *** | -0.192                                     | 0.053 | *** |
|                          | Diff    | -0.017                             | 0.054 |  | -0.020 | 0.118                              |     | 0.018                                      | 0.026 |     |
| Other western origin     | Reduced | 0.604                              | 0.064 | ***  | 0.631  | 0.061                              | *** | -0.163                                     | 0.049 | *** |
|                          | Full    | 0.617                              | 0.064 | ***  | 0.615  | 0.061                              | *** | -0.171                                     | 0.049 | *** |
|                          | Diff    | -0.013                             | 0.054 |  | 0.016  | 0.118                              |     | 0.008                                      | 0.026 |     |
| <i>N</i>                 |         | 22,622                             |       |  | 40,332 |                                    |     | 51,250                                     |       |     |

Logit coefficients and robust standard errors (clustered at the level of school) (KHB method).  
 The KHB method estimates logit models without and with mediation variables, and allows for mediation interpretation as is common in OLS regression.  
 (a) Reduced model: excluding mediation variable (standardised primary school test).  
 (b) Reduced model: excluding mediation variables (standardised primary school test and detailed track recommendation).  
 Control variables: gender and large city.

~  $p < 0.10$ .  
 \*  $p < 0.05$ .  
 \*\*  $p < 0.01$ .  
 \*\*\*  $p < 0.001$ .

pre-vocational/intermediate general recommendation (*vmbol/havo*). For each of the subsets, two models are estimated: one without standardised primary school test score and detailed track recommendation and one with these variables.

As is seen in the first set of models, there is a strong gradient for enrolling in the single-track pre-university schools by parental education and household income, also after holding constant for primary school performance and track recommendation by the teacher. If at least one parent has a university degree, the odds of going to the single-track gymnasium are about 35% higher than if neither of the parents have a university degree ( $e^{0.305}$ ). Children from the highest income quintile have odds of going to the single-track pre-university school versus not going of almost 60% higher than children from the lowest quintile ( $e^{0.457}$ ). These patterns fit more closely with a cultural sorting process than with a rational-functional allocation process, because these effects change little when we hold constant for school performance and teacher recommendation. Similar results on social selection into high-quality schools in England were demonstrated by Burgess and Briggs (2010).

For children with a migration background we find, somewhat surprisingly, little evidence of a cultural boundary theory, as they are over-represented in the single-track pre-university schools compared to native students with similar SES and academic achievement. One reason why this may be the case is that it is harder for children with a migration background to achieve the same primary school test score and the same teacher recommendation, factors that are controlled for here.

Turning to enrolment into the single-track pre-vocational schools, we see a mirrored SES pattern: children from more educated and economically advantaged backgrounds have a lower likelihood of entering a single-track pre-vocational school. Among children with a unitary pre-vocational recommendation, the SES gaps are reduced by about half if we hold constant for academic performance indicators. Among students with a mixed *vmbol/havo* recommendation, household income gaps are much less dependent on adding the controls for academic performance, suggesting that the cultural boundary theory is in place here.

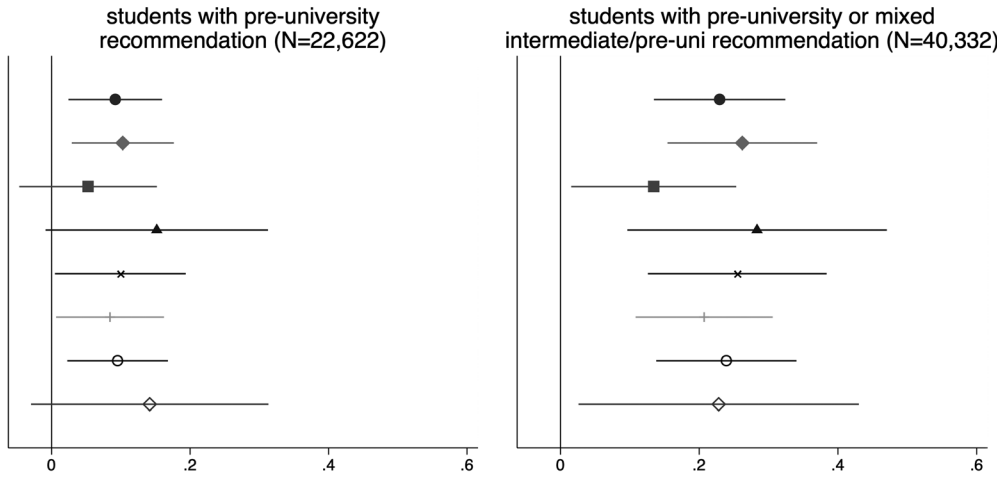
Children with a Moroccan migration background are more likely to enter single-track pre-vocational schools, also after holding constant for performance. In the full (controlled) models, other migrant groups have a lower likelihood of entering single-track pre-vocational schools than native children, although in the mixed-recommendation group these differences are often not statistically significant.

In sum, the socioeconomic differences are often quite persistent after holding constant for school performance. These gaps are in line with the cultural boundary theory.

#### *Attainment of the pre-university exam (vwo)*

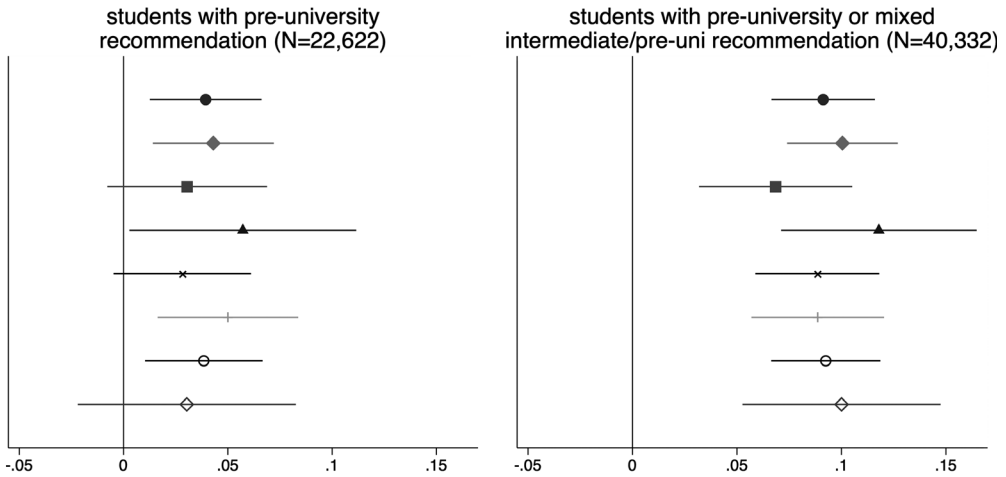
Figure 4 shows the estimated effects of attending an elite pre-university school location on the likelihood of obtaining the pre-university diploma within 6 years. This is done for two subpopulations: those with a unitary pre-university recommendation (*vwo*, graph on the left-hand side) and those including the pre-university and mixed pre-university/intermediary general recommendation (*havo/vwo*, graph on the right-hand side). The top figures show the IV estimates, and the bottom figures the OLS

IV estimates



effect size plus 95% c.i.  
Controlled for other background variables, gender, urbanisation and primary school test

OLS estimates



effect size plus 95% c.i.  
Controlled for other background variables, gender, urbanisation and primary school test

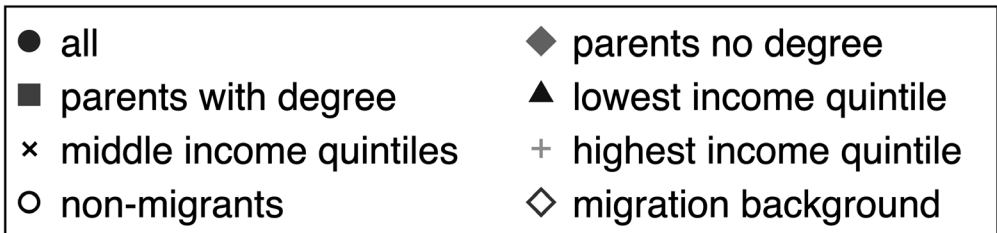


Figure 4. IV and OLS estimates of the effect of attending a single-track pre-university school on the likelihood of finishing the pre-university exam

estimates. The full results of the regression models, including F-tests and first-stage coefficients, are found in Tables S1-S4 in the online Supplementary Material.

Figure 4(top-left panel) shows that there is an overall positive effect of attending single-track pre-university schools on the likelihood of completing the pre-university exam of 0.09. In line with hypothesis 1, this implies that the probability is 9 percentage points higher in single-track schools than in schools where the pre-university exam is offered alongside other levels. There is some evidence of heterogeneous effects though. The effect is smaller, and not statistically different from zero, among students whose parents have completed a university degree (0.05, or 5 percentage points). The effect is strongest for students in the lowest income quintile (15 percentage points). The effect is also stronger for students with a non-western migration background, although this effect is not statistically significant. In sum, the positive effect of going to the elite pre-university schools is stronger for students from disadvantaged backgrounds, which is in line with hypothesis 2b. Note that these effects are controlled for the other background variables: gender, living in larger cities and the primary school test. The differences in effect sizes are not statistically significant though, as can be seen from the overlapping confidence intervals. However, with register (population) data we may be a bit cautious in interpreting statistical significance.

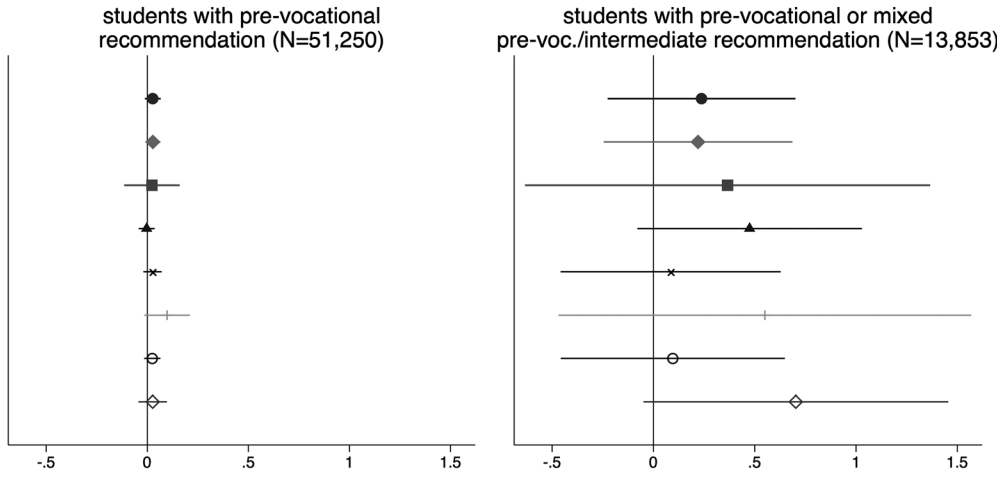
Looking at Figure 4(top-right panel), the results are stronger if we define a wider population (overall effect 0.23, reflecting a 23 percentage point higher probability of finishing the pre-university exam without delay if students go to a single-track pre-university school relative to a multi-track school). Here too we see some evidence of heterogeneous effects, with the weakest effect for students whose parent(s) have finished higher education (0.13). The F-tests for excluded instruments were sufficiently large, and the first-stage regression coefficients were all in the expected direction (see Tables S1 and S2).

The OLS estimates of the comparable model are shown in the lower panels of Figure 4 (for full models, see Tables S3 and S4). The effect sizes of attending single-track pre-university schools are a bit smaller compared to the IV estimates (roughly between 0.03 and 0.06), but remain positive and significant. Like in the IV models, the effects are larger among children in the lowest income quintile (6 percentage points higher probability of finishing the pre-university exam without delay), and smallest for children of college-educated parent(s) (3 percentage points). The relative distance measure is not significantly correlated with the likelihood of obtaining a pre-university (*vwo*) diploma (controlled for attending a single-track pre-university school), which is reassuring for the credibility of the estimated IV model. Also similar to the IV model is the fact that the effect sizes are larger if a wider population is taken (bottom-right panel of Figure 4; see Table S4). The distance measure has a significant coefficient, which indicates that the IV model is less adequate for this subpopulation.

#### *Attainment of the intermediate general exam (havo or higher)*

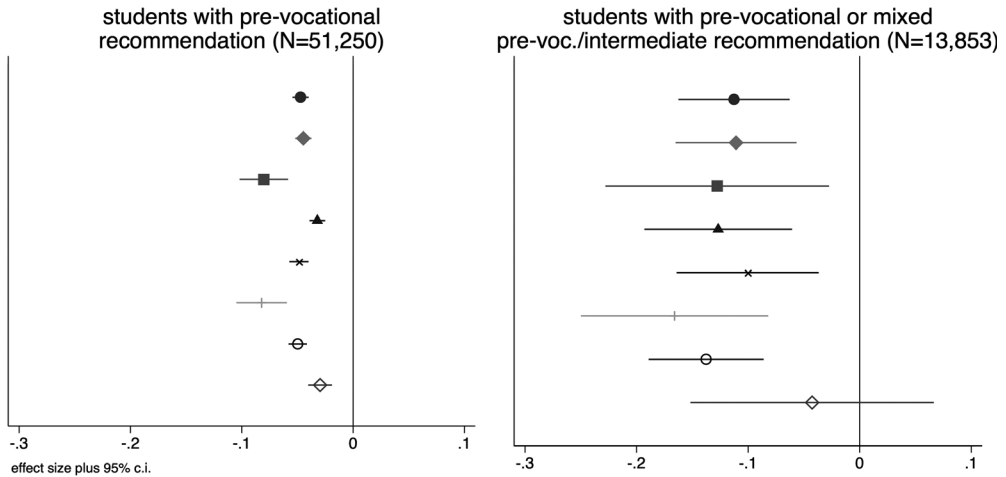
Figure 5 shows the results for entering single-track pre-vocational schools, examining the chance of completing a diploma at a higher level than that (IV and OLS estimations, coefficients in Tables S5 to S8 in the online Supplementary Material). If we

IV estimates



effect size plus 95% c.i.  
Controlled for other background variables, gender, urbanisation and primary school test

OLS estimates



effect size plus 95% c.i.  
Controlled for other background variables, gender, urbanisation and primary school test

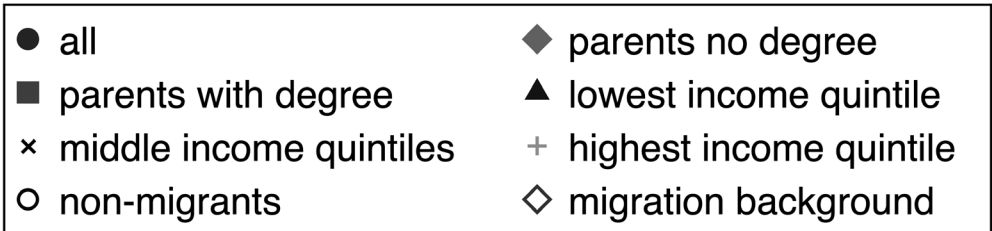


Figure 5. IV and OLS estimates of the effect of attending a single-track pre-vocational school on the likelihood of finishing the *havo* exam or more

narrow the population down to students who received a unitary pre-vocational recommendation in primary school (Figure 5, top-left panel), we do not see any evidence that their chance of obtaining a higher-level diploma is reduced by entering a single-track pre-vocational school location. The effect is basically zero, which refutes hypothesis 3. If anything, the effects are positive, and not negative as was expected. If we focus exclusively on students who received a mixed pre-vocational/intermediate general recommendation (*vmbo/havo*, top-right panel in Figure 5), the effects are also very small and not statistically significant. So also here, focusing on the ‘target group’ for whom a single-track pre-vocational school was expected to be harmful, we do not find evidence for that. The F-tests for excluded instruments were strong and significant for the model with the unitary pre-vocational recommendation, but not for the model with the mixed *vmbo/havo* recommendation students. In all cases the effect of the instrument was in the expected direction (i.e. the greater the relative distance to a single-track school, the less likely students are to enrol in such a school). Given the absence of effects, we found no support for hypotheses 4a and 4b.

The OLS models, with results shown in the lower panels of Figure 5, are more intuitive than the IV estimates; the association between enrolling in a single-track pre-vocational school and attaining the *havo* exam is negative (i.e. the likelihood of obtaining the intermediate general *havo* exam is greater in school locations that offer, besides pre-vocational education, also the *havo* track, as hypothesis 3 predicted). The negative effect is similar across social groups, which is in line with hypothesis 4a. Note that the relative distance measure of the nearest single-track pre-vocational and multi-track pre-vocational-plus school is significantly associated with the likelihood of obtaining an intermediate general (*havo*) diploma or more (see Table S7). This violates the exclusionary restriction that is needed to interpret the effects as causal. However, when the subpopulation is used for whom broad schools should be particularly effective (see Table S8), the relative distance does not have a significant relationship with the likelihood of obtaining the higher-level diploma, but the F-test is much lower in the accompanying IV model.

## Conclusion and discussion

Four main findings stand out in this article. First, there is sorting happening from the primary to the secondary school system that is not fully attributable to socioeconomic differences in student achievement or track recommendation by the teacher. High-SES students are more likely to enrol in single-track pre-university schools, and less likely to enrol in single-track pre-vocational school, than lower-SES students with identical standardised test scores and teacher recommendations.

Second, attending elite pre-university schools has a positive causal effect on the likelihood of completing the pre-university diploma on time. Even for students who enter secondary education with a recommendation for the pre-university track, and with similar standardised test scores, those who go to single-track elite pre-university schools are likely to finish the pre-university diploma on time. This result contradicts a study on elite single-track school enrolment in Amsterdam, where negative effects were found for students in the lower part of the ability distribution, and positive effects for students in the upper part of the ability distribution (within the target

group of high achievers) (Oosterbeek *et al.*, 2020). That study used lotteries for over-subscribed elite single-track schools in Amsterdam, while the current study identifies the causal effect for students in the whole country of enrolling in a school type (partly) because of geographical proximity.

Third, the evidence for the effect of attending a single-track pre-vocational school on the likelihood of achieving a *higher-level* secondary school diploma is more mixed. The IV model basically showed a null finding, implying that the likelihood of ‘escaping’ the pre-vocational track is similar between students attending a single-track or a broad school. However, in the OLS models it appeared that attending a single-track pre-vocational school limited the opportunity to get a higher-level diploma.

The fourth central finding is that these effects of the school offerings varied between students of different socioeconomic or migration backgrounds. The positive effect of attending single-track pre-university schools was stronger for students from less-privileged backgrounds (parents without a university degree, and the lowest income group). Thus, while this group is less likely to go to such schools, they benefit more from them. Also, the negative effect of attending a pre-vocational school on attaining the intermediate general diploma varied by student background, with stronger negative effects for students of advantaged families (at least in the OLS models). Or, in other words, children of advantaged families benefit more from multi-track schools, especially if they had a unitary pre-vocational recommendation. In the causal IV model this was not confirmed though.

What do these findings tell us about the rational-functional and cultural boundary theories of allocation and learning? It seems that the cultural boundary theory is relevant for understanding the allocation of different socioeconomic groups from primary to secondary schools. The classical gymnasiums are preferred by high-SES students, even conditional on detailed track recommendation, standardised school tests and urbanisation. There seems to be some continuity since the nineteenth century, when the gymnasiums were purposefully kept out of the secondary school laws to prepare the children of the elites for university access (Amsing, 2002).

Concerning the learning process *after* entering secondary school, however, even the most socially and academically selective single-track pre-university schools accommodate all examined social groups. Given that students from disadvantaged backgrounds seem to benefit relatively more from attending selective schools, the cultural boundary processes that drive the allocation to school types create unnecessary levels of socioeconomic inequality in the Dutch education system. If the allocation process had been driven less by cultural processes, the effectiveness of classical gymnasiums would have benefitted different social groups more equally (provided students have the required level of performance).

How do the findings on single-track pre-vocational schools relate to the rational-functional and cultural boundary theories? If children of advantaged backgrounds with lower academic achievement have the possibility to enrol in a school type that offers a later ‘way out’ by providing a broader set of tracks, they benefit more from such options than children from less educated and poorer backgrounds. This pattern fits the cultural theory of boundary-making, but it also illustrates that it may be hard to expect a reduction in socioeconomic inequalities if schools decide to combine tracks in one location.



The Dutch system is one of a few that have maintained its early moment of selection. Unlike in countries like the UK, France, Poland and the Nordic countries, which have reformed to later tracking in the past half century, the stratified system with pre-vocational, intermediate general and pre-university types of education has continued to exist since the nineteenth century. What did change, however, in the 1960s and 1970s was that tracks became more permeable, and broad schools were established that offered multiple tracks (following the so-called Mammoth Law). More recently, however, the Education Inspectorate has noted a decrease in the number of students who are educated in multi-track environments.

The current article sheds light on the political and public discussions about the tendency that schools have to become smaller again. Are the single-track pre-university schools bastions of inequality? Are pre-vocational schools limiting opportunities for students from disadvantaged backgrounds? Our results indicate that the single-track pre-university schools can be effective for large groups of students, also from disadvantaged backgrounds. Once they are in, they are not at a disadvantage—which may have been expected given a possible cultural mismatch between the home climate and school. What drives up inequality, however, is the (cultural) sorting process into single-track pre-university schools. An inequality-inducing effect of such schools is more evidently found in the sorting process than in the learning process once students are inside, but the cultural sorting process is hard to address with policy. The story is different with regard to single-track pre-vocational schools though. The negative effect of enrolling in a single-track pre-vocational school (on a diploma at a higher level than that) is not unequivocally demonstrated, but disadvantaged students seem to be less harmed by them than students from advantaged backgrounds. The advantaged group is both more likely to go to a multi-track school, and also benefits (somewhat) more from it in terms of finding their way upwards in the system. Broadening pre-vocational schools to include the intermediary general track may not reduce inequalities then, but even make them larger. This fits in a pattern more often found in sociological studies on educational inequality, namely that advantaged groups are benefitting from new opportunities at least as much as disadvantaged groups. Why would educational reforms *not* benefit children from advantaged backgrounds more, if their academic performance is lower than average for their social class?

Resourceful groups will always try to find ways in the system to give advantage to their children. It may be hard to reduce inequalities by policies affecting the tracks that schools offer, if such policies are not rolled out over the whole system. In Berlin, where the mixed *Gesamtschule* was introduced alongside the remaining classical gymnasiums, no reduction of inequalities was found, plausibly because the classical gymnasiums kept offering an opportunity for middle-class families to pass on their advantage (Maaz *et al.*, 2013). Comprehensive reforms have been more encompassing in England, where the system has been replaced throughout localities, but with some Local Education Authorities still offering state grammar schools. The effects of the English comprehensive reforms have mostly been found in the sorting process (Gorard & Siddiqui, 2018), while the effects on social mobility seem to be more limited (Boliver & Swift, 2011). Other societies have most rigorously reformed the tracked system into untracked comprehensive education, most notably in the Scandinavian countries and France. Given that nationwide reforms towards later tracking

have reduced socioeconomic inequalities in educational attainment (Van de Werfhorst, 2019), policies to address widening inequalities may require more rigorous measures than promoting a subset of schools to offer multiple tracks.

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## Ethical guidelines

This research conforms to the ethical guidelines of the Amsterdam Institute for Social Science Research, University of Amsterdam. All results have been checked by Statistics Netherlands to ensure confidentiality and unidentifiability of individuals, following their standard procedures.

## Conflict of interest

There are no conflicts of interest.

## Data availability statement

The register data that support the findings of this study are available from Statistics Netherlands. Restrictions apply to the availability of these data, which were used under licence for this study. Data can only be analysed within the digital environment for the use of register data at Statistics Netherlands.

## NOTES

<sup>1</sup> I excluded from the analyses two categories: students who were recommended to special education (0.3% of the cohort in the recommendation) and students who enrolled in practical education (praktijkonderwijs, around 2.2% of the cohort in the first year in secondary school—for students with learning disabilities for whom the pre-vocational track is too difficult).

<sup>2</sup> Excluding special education, students who have not received a recommendation and students without assignment of a secondary school level (single or multi-track) in 2011.

<sup>3</sup> Currently the Ministry of Education, Culture and Sciences is investigating the comparability of the other suppliers of final school tests, and before that is finished it is preferable to focus on the large majority of schools that take the final Cito test.

<sup>4</sup> The address at which the student lives on 31 August 2011, which is the start of the first year of secondary school. Six-digit postcodes identify one side of a street or less.

<sup>5</sup> Stichting het Zelfstandig Gymnasium, [gymnasia.nl](http://gymnasia.nl) (accessed 15 July 2019).

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## SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

**Table S1.** IV regression of finishing pre-university exam, for students with unitary pre-university recommendation

Table S2. IV regression of finishing pre-university exam, for students with pre-university recommendation or mixed pre-university/intermediate recommendation

**Table S3.** OLS regression of finishing pre-university exam, for students with unitary pre-university recommendation

**Table S4.** OLS regression of finishing pre-university exam, for students with pre-university recommendation or mixed pre-university/intermediate recommendation

**Table S5.** IV regression of finishing intermediate general diploma or higher, for students with unitary pre-vocational recommendation

**Table S6.** IV regression of finishing intermediate general diploma or higher, for students with mixed pre-vocational/intermediate general recommendation

**Table S7.** OLS regression of finishing intermediate general diploma or higher, for students with unitary pre-vocational recommendation

**Table S8.** OLS regression of finishing intermediate general diploma or higher, for students with mixed pre-vocational/intermediate general recommendation