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A Setback Set Right?
Unfortunate Timing of Family Distress and Educational Outcomes

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A Setback Set Right?

Unfortunate Timing of Family Distress and Educational Outcomes[†]

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Abstract

In this paper I present causal evidence that a relatively mild event of family distress can have lasting negative consequences in a context with high-stakes standardized testing. I investigate how children's educational outcomes are affected by experiencing a common form of family distress - the death of a grandparent - shortly before taking a test that co-determines secondary school track placement. I employ administrative registers from the Netherlands that allow me to obtain causal estimates by exploiting the quasi-random timing of death with respect to the track placement test. The findings show that grandparental loss at an unfortunate time leads to reduced test performance, and consequently an increased likelihood of attending or graduating from the lowest track of secondary education. These negative effects on secondary school outcomes are further aggravated by the subjective teacher recommendation, as children who lost a grandparent receive a lower track recommendation. The possibility to participate in a makeup test and switch tracks later-on mitigates part of the negative effects, although it is not able to fully offset the initial setback. The findings underline the importance of understanding the interaction between the educational setup and family distress for ensuring educational equality of opportunity.

Keywords: education system, equality of opportunity, family distress
JEL-Codes: I21, I24, I31, J13

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1 Introduction

Many children experience some type of family distress during school age. Examples are divorce, parental unemployment, and illness or death of a family member. From the literature we know that these events can have a negative effect on children's educational accomplishments (e.g. Amato and Anthony, 2014; Francesconi, Jenkins, and Siedler, 2010; Oreopoulos, Page, and Stevens, 2008). However, it is less apparent whether the lower school performance arises purely from the family setback altering childhood conditions, or if the institutional setup might prevent these children to reach their full potential? In particular, it is unclear how the consequences of family distress are mediated by one of the most important determinants of equality of opportunity: the educational environment.

To enhance educational equality one of the key instruments many countries employ is standardized testing to assess children's qualifications. The idea behind standardized testing is that it provides an objective measure of ability, which is free of biases regarding children's background characteristics. Consequently, standardized tests are often used to inform important educational decisions such as secondary school track placement or admission to higher education. Yet, in the light of family distress, standardized tests may introduce new biases and inequalities if they are taken under unequal test conditions. Even a relatively minor family setback could possibly have long-term negative consequences if its timing with respect to a critical standardized test is unfortunate. At the same time, the educational environment might comprise of features that better adopt to temporary distress situations such as teacher evaluations, repetitive testing, or re-assessments of educational decisions.

In this paper I am concerned with educational equality of opportunity after children experience adverse life-events during childhood. First, I explore if the consequences of family distress are aggravated in settings that employ high-stakes standardized testing. Second, I analyze whether there are educational practices that can mitigate the potential negative effects of family distress.

To answer these questions, I investigate how children's educational outcomes are affected by experiencing a common form of childhood distress - grandparental death - shortly before taking a high-stakes standardized test. I focus on grandparental death as it is a relatively common event in children's life that can cause immediate distress. In many families, grandparents are key figures in a child's life, with more than 40 percent of grandparents in Europe frequently caring for their grandchildren (Glaser et al., 2013). Distress after grandparental death materializes through two main potential pathways: via the child itself or via the child's parents. When children experience emotional distress this can lead to poorer educational performance, for instance by lowering the ability to concentrate. In addition, when parents are grieving this may reduce the mental and time resources available to children, which could in turn adversely affect a child's educational outcomes. As emotional distress after the death of a grandparent is likely to be of a temporary nature, at first sight it appears that this should not have lasting consequences for educational

outcomes per se. However, the literature shows that even short-lived disadvantages before birth can have persisting effects in adulthood (for a review see Almond, Currie, and Duque, 2018). Especially due to the dynamic nature of human capital development, temporary setbacks at crucial moments in a child's life may have lasting consequences (Cunha and Heckman, 2007; Cunha, Heckman, and Schennach, 2010).

Regarding the high-stakes standardized test, I use a feature of the Dutch education system where children in the final grade of primary school participate in a standardized test that co-determines their secondary school track placement. This is a suitable setting to investigate the research questions, as first it allows me to estimate the immediate effects of experiencing the death of a grandparent shortly before the test on test scores itself, as well as the short- and long-term effects on track placement, track attendance and graduation performance. Second, the Dutch context bears the advantage that I can analyze several educational practices that may mitigate the consequences of the initial shock. In particular, I investigate the role of the option to take a makeup test, the existence of teacher recommendations, as well as the possibility to switch tracks after the initial placement.

I identify potential effects by taking advantage of the quasi-random timing of grandparental death in relation to the track placement test, in a similar vein to Persson and Rossin-Slater (2018). Using rich administrative data from the Netherlands, I construct the treatment and control group based on whether children experience grandparent bereavement shortly before or after the test is conducted, respectively. By comparing the educational outcomes of both groups I identify the causal effect of grandparental death if conditional on the occurrence of a grandparent dying, the exact timing with respect to the test is random. As both the treatment and control group experience grandparental death in the three months surrounding the test, this strategy solves two main threats for causal identification. First, the strategy addresses potential selection bias that arises as grandparental death might be correlated with parental age, life-style and socioeconomic background. Second, the approach subtracts other effects the death of a grandparent may have on child education outcomes, for example due to a change in financial resources or childcare support. As a result, the estimated effect solely reflects how the standardized test influences the consequences grandparental death has on children's educational outcomes.

The findings show that experiencing grandparent bereavement shortly before a high-stakes standardized test can have longstanding negative effects on educational outcomes. Losing a grandparent during the three months prior to the test, lowers children's test score by roughly 3 percent of a standard deviation. I observe this decrease in test performance despite that the participation rate of the makeup test doubles for the treatment group, most likely because the fraction of children who takes the makeup test remains minor. As the teacher recommendation co-determines track placement, it could offset the impact of the poorer test outcomes. However, I find that children in the treatment group receive lower recommendations, thereby aggravating the impact grandparental death has

on track placement, especially for those children that also perform worse on the test. As a consequence, treated children have a 0.87 percentage point higher chance to be placed in the vocational track at the start of secondary school, compared to starting in the general, academic or combined track. To mitigate the poorer initial track placement children may change to higher tracks later-on. I indeed find that treated children have a 0.22 percentage point higher chance to switch to a track upward during the first few years of secondary school. Nonetheless, for most children the negative consequences persist until the end of secondary school. Four years after initial track placement, treated children have a 1.08 percentage point higher chance to attend the vocational track and a 0.92 percentage point lower chance to attend the academic track. These effects do not differ depending on child-grandparent characteristics such as gender, geographical distance, or maternal vs. paternal family side.

This paper adds to a large stream of literature that analyses how permanent child characteristics interact with educational policies. It is well-documented that there are achievement gaps in standardized test scores between genders, socioeconomic status and migration background (Ammermueller, 2007; Fryer and Levitt, 2010; Guiso et al., 2008; Schneeweis, 2011; Schnepf, 2007; Schuetz, Ursprung, and Woessmann, 2008). Likewise, studies that explore the impartiality of teachers' evaluations, find that subjective assessments of ability tend to be influenced by children's gender and family background (Burgess and Greaves, 2013; Carlana, 2019; Lavy and Sand, 2018; Lüdemann and Schwerdt, 2013; Ready and Wright, 2011). Educational tracking is another policy whose impact on equality of opportunity is extensively investigated. Most papers observe that early tracking reinforces the influence of parental background (for a review of the literature see: Betts, 2011). Track switching later-on can to a limited extend help children to overcome initial disadvantages in the tracking process, although this option is more often employed by children from more favorable socioeconomic backgrounds (Dustmann, Puhani, and Schönberg, 2017; Dutch Education Inspectorate, 2017; Mühlenweg and Puhani, 2010). In contract to this extensive literature on the interaction between permanent characteristics and educational practices, how a temporary family setback interacts with the educational environment received little attention at present.

This paper also relates to the literature that focuses on the general educational consequences of more severe events of family distress, for example divorce, parental unemployment, illness or death. Most papers find that these setbacks have negative impacts on children's educational and labor market outcomes such as school grades (e.g. Amato and Anthony, 2014; Rege, Telle, and Votruba, 2011), educational attainment (e.g. Coelli, 2011; Francesconi, Jenkins, and Siedler, 2010; Johnson and Reynolds, 2013) and adult labor earnings (e.g. Adda, Bjorklund, and Holmlund, 2011; Fronstin, Greenberg, and Robins, 2001; Gruber, 2004; Oreopoulos, Page, and Stevens, 2008). However, the existing literature leaves it unclear whether (part of) the observed negative effects on educational outcomes after family distress are influenced by features of the education system. An ex-

ception is the paper by (Steele, Sigle-Rushton, and Kravdal, 2009) who provide suggestive evidence that educational transitions are particularly important instances where children face negative consequences after experiencing family distress.

The rest of the paper is structured as follows. In section 2 I provide background information on the Dutch education system, and describe the data in more detail. Section 3 sets out the empirical strategy and the underlying identifying assumption. The results are described and discussed in section 4. Section 5 presents the robustness analysis. Finally, section 6 concludes.

2 Background and Data

In this section I first describe the institutional features of the Dutch education system that make the Netherlands a well-suited setting to study the effects of unfortunate timing of distress. In particular the presence of a high-stakes standardized test that, together with a teacher recommendation, informs children's secondary school track placement. Second, I describe the Dutch administrative records on which I base the empirical analysis. The high-quality administrative data make it possible to link family members to each other, and merge a wide range of background variables at an individual level.

2.1 The Dutch Education System

In the Netherlands, children enter primary school at the age of four.[1] The first two years consist of kindergarten, after which six years of general primary education follows. Consequently, most children are twelve years old when they transition to secondary school. Within secondary education children sort into tracks based on ability. There are three main tracks: preparatory vocational secondary education (vocational), senior general secondary education (general) and university preparatory education (academic). The tracks differ in course content, duration and entry-qualifications they provide for post-secondary education.[2] In addition, the vocational track consists of several sub-tracks that vary the weight they place on theoretical versus practical content.

Parents and children are free to choose the secondary school they apply to. However, the decision whether a child is admitted to a school, as well as which track a child will attend, lies with the secondary school. Secondary schools base their decision on the educational report primary schools prepare for each pupil at the end of the sixth grade. This educational report consists of two key components: outcomes of standardized track placement tests, and a teacher recommendation. Often secondary schools set fixed requirements concerning a minimum test score or track level recommendation to be admitted to

[1] Education is mandatory from the age of 5 to 16, which makes the first year optional, although it is common practice to attend the first year.

[2] See figure A1 in the appendix for an overview of the complete education system, including post-secondary education.

a specific track.[3] Some secondary schools offer the possibility to start in so-called "bridge classes", which combine two tracks together, and postpone the final track decision for one or two years. Moreover, under certain circumstances it is possible to switch to a different track during the first three years of secondary school. Changing tracks is often bound to strict conditions based on particularly good or poor performance of a child. In recent years roughly 50 percent of all children attended the vocational track, 24 percent the general track and 20 percent the academic track (Dutch Inspectorate of Education, 2018).[4]

The setting of the high-stakes standardized test makes it a particularly appropriate context to investigate the consequences of the unfortunate occurrence of grandparent death. For one, although legally it is not mandatory to conduct a specific track placement test, almost all primary schools do so.[5] The most commonly employed standardized placement test is designed by the Cito organization, with a participation rate of roughly 85 percent of all primary schools. A second advantage is that the answer sheets are mechanically graded by the Cito organization, and therefore not compromised by teachers' beliefs. Cito's placement test consists of questions on three parts: Dutch language (100 items), mathematics (60 items), and study skills (40 items). The number of correct answers are converted into scores that range from 501 to 550 points, with an average score of roughly 535. Cito aims to keep an equal level of difficulty throughout the years, and if necessary they calibrate scores to facilitate comparison. A last advantage of this setting is that the test is administered during three pre-determined days in February in the whole of the Netherlands. When children are sick or otherwise absent during these days, it is possible to take part in a makeup test, which is conducted a few weeks later. Both parents and the school receive the test outcomes which include the final score, as well as a recommendation which secondary school track, or combination of tracks, fits best according to the test score. The primary school teacher often uses this information to form a definitive track recommendation, which is generally given after the test results are known. Besides the track placement outcome, teachers also consider beliefs on ability, soft skills, motivation and home environment to a greater or lesser extent in determining their track recommendation (Timmermans, de Boer, and van der Werf, 2016).

2.2 Data

This paper uses administrative records provided by Statistics Netherlands.[6] The records include data on the universe of children who participated in the track placement test

[3] As secondary schools are held accountable for how many of their pupils pass the centralized exams at the end of secondary school, they have an incentive to place children in a track that aligns with a child's abilities.

[4] The other 6 percent of pupils followed practical or special needs education.

[5] In 2015 new regulations have been implemented surrounding the transition to secondary school, therefore the analysis focuses on the years prior to 2015. Among others it became mandatory for all schools to conduct a track-placement test, for teachers to give their recommendation before the test is conducted, and prohibits secondary schools to inquire about a child's test score.

[6] Under certain conditions, these microdata are accessible for statistical and scientific research. For further information see microdata@cbs.nl.

between 2006 and 2014. For each child the records contain the number of correct answers for the different parts of the test, the final score, and whether they took the regular or makeup test.[7] In addition, for part of the pupil population the records include a tentative teacher track recommendation which is filled in at the time of the test. Children obtain the definitive teacher recommendation after the test results are known, however this information is unfortunately not available. I exclude children who do not participate in secondary education in the year after the test (1.7 percent), that could not be linked to their parents (0.9 percent), or who had any missing background information (5.8 percent). The baseline sample consists of 1,101,571 children.

To identify the occurrence of grandparent death I link each child to their grandparents, and combine this with information from the death registers which contain the exact date and cause of death of all Dutch inhabitants. From the baseline sample roughly half of all children lost at least one grandparent until the end of primary school, and 5.9 percent lost a grandparent in the final grade. The causes of death are categorized according to the International Classification of Diseases (ICD-10) codes of the World Health Organization. The two most common causes of death of grandparents are cancer (33.8 percent) and heart diseases (28.7 percent). As the impact of a grandparent dying may depend on the foreseeable nature of the loss, I distinguish between expected and unexpected deaths. In line with existing studies I classify unexpected causes of death as heart attacks, cardiac arrests, congestive heart failures, strokes, traffic and other accidents, violence and sudden deaths from unknown causes (Andersen and Nielsen, 2010).[8] From all grandparents who passed away in the final grade of primary school roughly 14 percent died from unexpected causes.

The secondary education registers comprise of children's post-transition school outcomes. For each year of secondary school I observe the track a child attends, including whether a child is in a bridge class which combines multiple tracks. Unfortunately I can not observe which exact tracks are combined for children attending bridge classes. The widespread use of bridge classes complicates classifying children as attending one specific track. Instead, I construct two indicators that capture whether a child is placed directly in respectively the vocational or academic track, instead of the other tracks or a bridge class.[9] From the tenth grade upwards bridge classes are no longer made use of, and I observe for all children which of the three main tracks they attend. In addition, for the cohorts who took the placement test between 2006 and 2011, I have data on which track children graduated from and their centralized exam scores of Dutch and English at the end of secondary school. Table 1 displays the relative size of the vocational, general, academic and bridge track for grades 7 to 10.

[7] If children take part in the test more than once, I only keep the most recent score. Children can make the test more than once in case they have to repeat the final grade of primary school.

[8] The corresponding ICD-10 codes are: I22, I23, I46, I50, I60-69, R95-97, V00-99, W00-99, X00-59 and X86-90.

[9] I do not construct an indicator variable of the general track as it is unclear what it means to start directly in this track compared to a bridge class.

Table 1: Percentage of children per track by grade

	Vocational track	General track	Academic track	Bridge class
Grade 7	24.5	3.2	13.3	59.0
Grade 8	30.0	15.2	21.7	33.1
Grade 9	44.5	25.3	26.1	4.1
Grade 10	45.5	29.7	24.8	0

Notes: Table 1 shows the percentage of children in each track for the first four years of secondary school. The numbers are based on a sample of 34,022 children who lost a grandparent three months before and after the standardized test.

Finally, the administrative records provide information on a wide range of background characteristics. This consists among others of basic child demographics such as age, gender, migrant status, number of siblings and birth order.[10] From parents I observe their age, receipt of unemployment-, social- or disability benefits, and whether they have siblings.[11] Regarding household characteristics, the registers contain data on whether it is a single-parent household, yearly disposable income, and geographical location of the household. All variables are measured on the first of January the year before the child takes the track placement test, to prevent grandparental death affecting any background characteristics, such as household income and composition.

3 Empirical Strategy

This section sets out the strategy to answer whether the consequences of a grandparent's death are aggravated or softened by high-stakes standardized tests and other common educational practices. The first part describes the estimation approach, while the second part discusses the underlying identifying assumption.

3.1 Estimation Approach

There are two main threats to address when causally estimating the impact of unfortunate timing of grandparental death. First, families experiencing grandparental death when children are in primary school may be different from households that experience this later in life. If unobserved family characteristics are correlated with the occurrence of grandparental death during school age, a selection bias arises. The presence of selection is probable, as mortality coincides with among others families' socioeconomic background (Glied et al., 2012). Second, a problem arises when grandparental death impacts track choice not only via its interaction with the standardized test, but also via different pathways. For example, a family may receive a positive income shock after the death of a grandparent due to the inheritance of money, or parents might have more free time as

[10] Siblings are defined as children with the same mother.

[11] Unfortunately, the educational registers are incomplete for older generations.

they don't have to provide informal care to their elderly anymore. In this case, it becomes difficult to separate the different effects from each other.

To solve both concerns this paper exploits the random timing of a grandparent's death during the months before and after the standardized high-stakes test, a strategy similar to the one employed by Persson and Rossin-Slater (2018). In particular, I compare children experiencing the death of a grandparent in the three months prior to the track placement test, with children experiencing the same setback during the three months after the placement test.[12] As respectively both the treatment and control group experience grandparental death in the final grade of primary school, this comparison is less susceptible to selection bias. Moreover, it allows me to disentangle the intermediating effect of the standardized test from any other effects of losing a grandparent, as only the treatment group experiences grandparental death before the test is conducted.

Accordingly, I estimate the following regression model:

$$Y_i = \beta_0 + \beta_1 DeathBefore_i + \gamma' X_i + \epsilon_i \tag{1}$$

where Y_i is the set of educational outcomes of child i. $DeathBefore_i$ is the treatment dummy, which is one when children experience the death of a grandparent during the three months before the track placement test, and zero if children experience it during the three months after. Consequently, β_1 is the coefficient of interest and captures the effect of experiencing grandparental death before - instead of after - the high-stakes test.[13] X_i contains a set of background characteristics, including: gender, age, migration background, mother's age, number of siblings and disposable household income. All regressions are clustered by mother's ID.

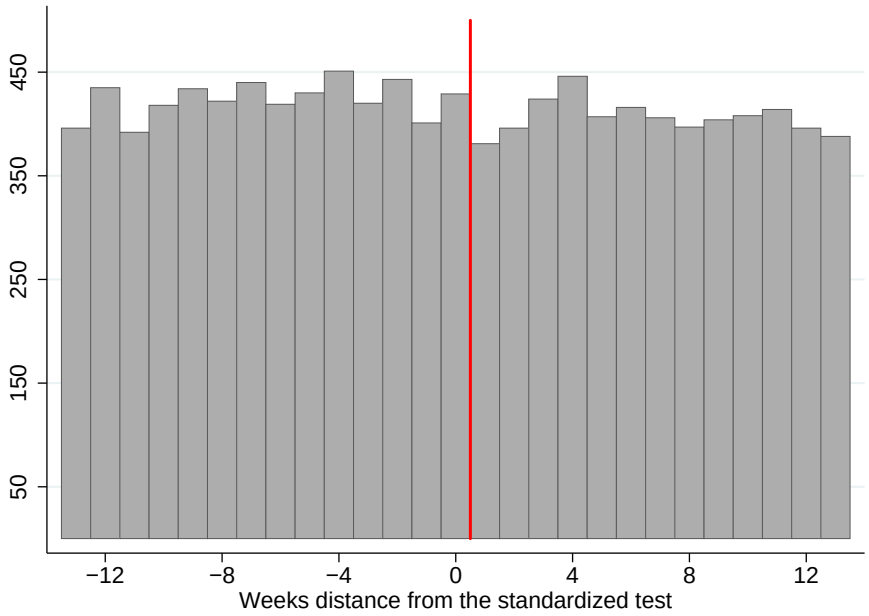
3.2 Identifying Assumption

The identifying assumption that needs to hold for the above strategy to estimate causal effects is that conditional on the death of a grandparent, the exact timing of death within the six-month period surrounding the standardized test is random. This assumption holds two testable implications. First of all, it should not be possible to control or manipulate the timing of grandparental death. It is reasonable to assume that this holds, as death is an event over which people have little to no control. Figure 1 underlines this, as it shows the weekly frequency of grandparental bereavement in the three month-period before and

[12] I do not perform a full regression discontinuity (RD) analysis, as treatment is not an uniform concept in this setting. In a regular RD design all observations below the cutoff receives the *same* treatment. However, in this setting the treatment a child receives depends on the date a grandparent dies and hence differs between children in the treatment group. For example, it is unclear whether it is worse to lose a grandparent a week before the test when the grieving processes just started, or three months before the test when it might distort test preparations. The aspect all children in the treatment group have in common, is that they all lose a grandparent before the test, which is what I exploit with my empirical strategy. In addition, to capture any time patterns in the robustness analysis I implement month dummies.

[13] The estimated coefficient could represent a lower-bound effect, due to children in the control group being somewhat affected at the time of the test. For instance, when grandparents are sick before they pass away this could have already caused distress to children. In the robustness analysis I test this possibility.

Figure 1: Weekly frequency of grandparental death



Notes: Figure 1 shows the frequency of grandparent death by week. Week "zero" refers to the week the track placement test is conducted.

after the standardized test. There is no significant change visible in the prevalence of grandparental death around the test week. Moreover, the graph shows no signs of seasonal patterns, which is advantageous as seasonal patterns can cause selection problems in case they correlate with background characteristics.

The second implication from the identifying assumption is that it should not be possible to influence the timing of the standardized test. As the test dates are fixed nationwide by the Cito organization, parents cannot change the date their child takes the test. However, as the test is not mandatory, it is possible for children to not take the test at all. Therefore, I analyze whether children who lose a grandparent prior to the test more often select out of taking the test. I merge the baseline sample with all registered sixth graders, to include those children that do not participate in the placement test.[14] With this extended sample I check whether the probability of being in the baseline sample - put differently, to take the test - is correlated to a child's treatment status. The results are presented in table A1 in the appendix and show that losing a grandparent before the test date, does not predict participating in the track placement test.

Table 2 presents descriptive statistics for the baseline population, as well as the treatment and control group. The descriptives show that the empirical strategy is successful in constructing a treatment and control group that have similar pre-treatment observables. The only exception is parental age, with children in the treatment group having statistically significant older parents. However, as the age difference comes down to a bit over one

[14]Due to data limitations this is only possible from the school year 2008/2009 onward.

Table 2: Descriptive statistics

		Children who lost a grandparent		
	(1) All children	(2) Treatment	(3) Control	(4) Difference
Child characteristics				
Age	11.46	11.46	11.45	-0.01
Boy (%)	49.74	49.65	49.69	0.04
Migrant background (%)	19.87	9.87	9.56	-0.31
Oldest child (%)	47.03	53.05	52.43	-0.62
Household characteristics				
No. of children	2.56	2.53	2.53	-0.00
Single-parent (%)	13.04	11.22	11.34	0.12
Disposable yearly income (€)	44,747	46,380	46,250	-130
Parental characteristics				
Mother's age	42.13	43.35	43.25	-0.10**
Mother has siblings (%)	82.94	90.00	90.26	0.26
Unemployment benefits - mother (%)	1.28	1.25	1.30	0.05
Social assistence - mother (%)	4.76	2.43	2.27	-0.17
Disability insurance - mother (%)	2.92	2.55	2.62	0.07
Father's age	44.83	45.93	45.82	-0.11**
Father has siblings (%)	80.19	88.93	89.42	0.49
Unemployment benefits - father (%)	1.46	1.23	1.35	0.12
Social assistence - father (%)	2.14	0.96	0.96	-0.00
Disability insurance - father (%)	2.45	2.08	1.93	-0.15
Grandparental characteristics				
Death of grandfather (%)		58.21	58.78	0.57
Death on mother's side (%)		45.96	46.51	0.55
Unexpected cause of death (%)		14.07	13.99	-0.08
N	1,101,571	17,214	16,808	34,022

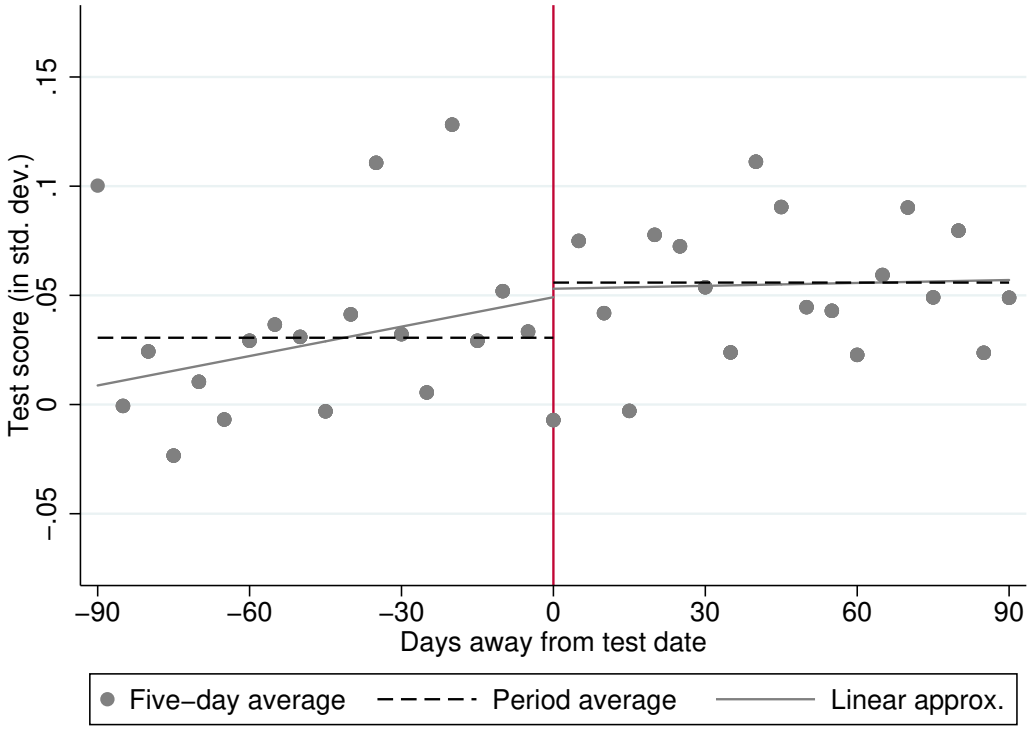
Notes: Table 2 shows the descriptive statistics of the main background characteristics. Column 1 includes the baseline sample, which consists of the population of children who made the track placement test between 2005/2006 and 2013/2014. Column 2 and 3 include from the baseline sample those children who respectively lost a grandparent in the three months before and after the track placement test is conducted. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

month, the effect size is negligible. The balance regressions confirm the similarity between treatment and control, with the only statistically significant coefficient being mother's age (see appendix table A2). Nonetheless, it is worthy to note that the children in the treatment and control group come from more advantaged households than the average child in the population. On average, the children experiencing the death of a grandparent in sixth grade have older parents, less often have a migration background, have fewer siblings, are less likely to grow up in a single-parent household, and have parents who are less frequently on benefits and who earn a higher income.

4 Results

This section starts with analyzing the effects of experiencing pre-test grandparental death on educational outcomes within the immediate-, short- and long-term. This is followed

Figure 2: Track placement test score by time of grandparental death



Notes: Figure 2 shows the track placement test score in standard deviation at the end of sixth grade by time of grandparental death. The red vertical line indicates the time of the track placement test. The solid gray line shows the periods' time trends, while the dotted black line presents the periods' averages.

by examining heterogeneous responses based on child-grandparent background characteristics.[15]

4.1 Immediate Effects

The direct impact of a grandparent dying shortly before the standardized placement test is on test performance itself. The potential negative effects on test performance can be mitigated by participating in the makeup test, as it is conducted a few weeks later than the regular test.

Standardized Placement Test Figure 2 displays the raw test score averages by time of grandparental death, and gives a first indication that children who lose a grandparent before the test indeed perform worse than children who lose a grandparent afterwards. Moreover, the solid lines suggest that the effect of grandparental death is stronger if it happens two to three months, instead of two to three weeks, before the test date.

[15]The results are based on calculations by the author using non-public microdata from Statistics Netherlands.

Table 3: Effect of grandparental death on track placement test outcomes

	(1) Total score	(2) Language score	(3) Math score	(4) Study-skills score
Grandparental death	-0.0293***	-0.0340***	-0.0207**	-0.0193*
	(0.0101)	(0.0100)	(0.0102)	(0.0101)
N	34,022	34,022	34,022	34,022
Controls	Yes	Yes	Yes	Yes

Notes: Table 3 presents the effect of pre-test grandparental death on the track placement test. The estimated coefficients are expressed in standard deviations. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

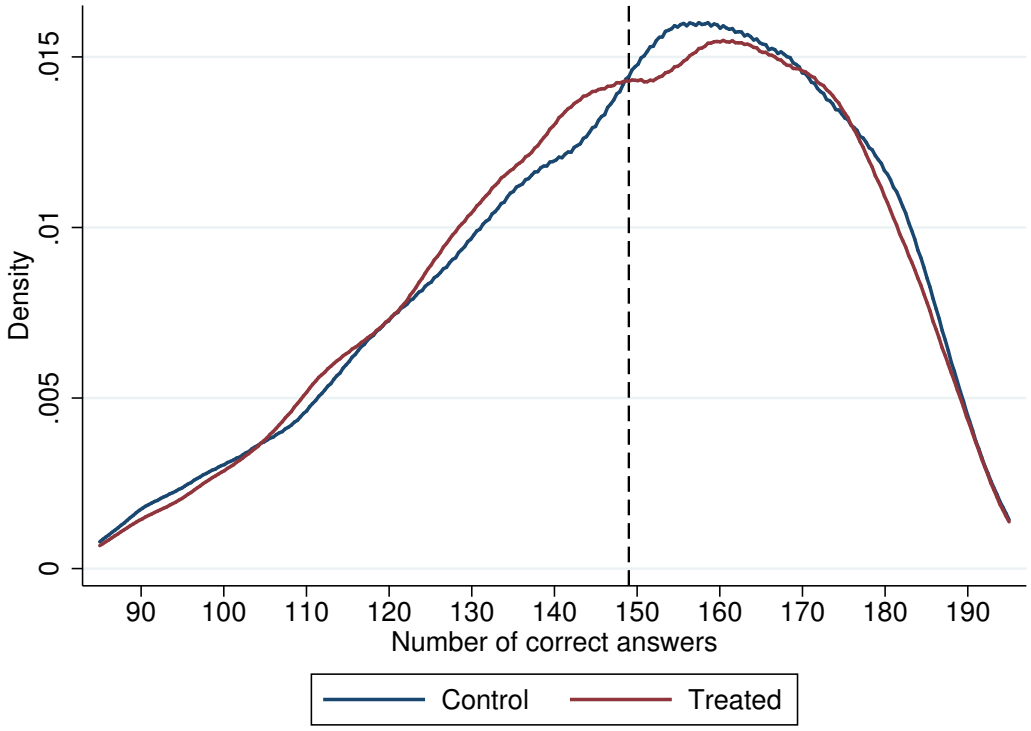
Table 3 presents the corresponding regression results of the effects of experiencing grandparental death on test performance in sixth grade.[16] Column 1 shows that losing a grandparent in the three months leading up to the test reduces the total test score by 0.0293 of a standard deviation. Columns 2 to 4 display that the negative treatment effect holds for all three parts of the test separately, ranging from -0.0340 of a standard deviation for language to -0.0193 of a standard deviation for study skills. The reduction in test scores of roughly 3 percent of a standard deviation after experiencing grandparental death, is slightly smaller than the impact of other types of disturbances that may influence test outcomes. For instance, a drop in the Air Quality Index by one standard deviation has been associated with a decrease of exam performance of 3.9 percent of a standard deviation (Ebenstein, Lavy, and Roth, 2016). Whereas a one standard deviation increase of temperature has been found to induce a decline in test performance of 5.5 percent of a standard deviation (Park, 2019).

In addition, figure 3 compares the distribution of the number of correct answers between the control and treatment group. The figure shows that the treatment group comparatively has fewer children scoring slightly above the mean, and more children scoring just below it. At the tails, however, I do not observe any significant differences. This implies that the bereavement effect seems to mainly materialize around the mean, while particularly low- or high-performing pupils are less affected.

Makeup Test Table 4 shows what happens with the take up rate of the makeup test after experiencing the death of a grandparent. Column 1 demonstrates that children who lose a grandparent before the test are 0.37 percentage points more likely to take part in the makeup test. Since of the overall population of Dutch pupils only 1.1 percent of all children take part in the makeup test, this is a substantial increase. As it is so rare to take the makeup test, I look closer at whether the exact timing of grandparent bereavement

[16]This is including the children who take part in the makeup test.

Figure 3: Density of number of correct answers by treatment status



Notes: Figure 3 shows the density of the number of correct answers on the track placement test at the end of sixth grade by treatment status. The dotted black line presents the sample's average.

Table 4: Effect of grandparental death on makeup test participation

	(1) Makeup test	(2) Makeup test
Grandparental death	0.0037***	
	(0.0012)	
Grandparental death: 0-1 months		0.0099**
		(0.0020)
Grandparental death: 1-2 months		0.0006
		(0.0016)
Grandparental death: 2-3 months		0.0001
		(0.0016)
N	34,022	34,022
Controls	Yes	Yes

Notes: Table 4 presents the effect of pre-test grandparental death on makeup test participation. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

matters for who makes use of this possibility. Column 2 shows the effect by month of death, and the results indicate that the effect is solely driven by children who lose a grandparent during the month directly before the track placement test takes place. For this group of children I observe an increased probability of taking the makeup test by almost 1 percentage point, which is equal to a 91 percent increase compared to the control group's average. This time pattern of makeup test participation partially explains the weaker negative effect on test performance the month before the test portrayed in figure 2. However, it cannot fully explain the weaker effect as still only 2.1 percent of all treated children take the makeup test. Another explanation could be worsened school behavior during the crucial months leading up to the test, where the closer a grandparent's death occurs to the test date, the less a child misses out on and is affected.

4.2 Short-Term Effects

In the short run the lower standardized test scores may have consequences for children's initial track placement at the beginning of secondary school. Besides the standardized test, the teacher's recommendation determines a child's track placement. Hence, primary school teachers are in theory able to compensate for the negative effects of poorer test outcomes through their track recommendation.

Teacher Recommendation Table 5 regresses pre-test grandparental death on a tentative teacher recommendation which is available for a subsample of children. This tentative advice is filled in before the test outcomes are known, and can differ from the definitive

Table 5: Effect of grandparental death on teacher advice

	(1) Advice: Vocational	(2) Advice: Academic
Grandparental death	0.0159***	-0.0077*
	(0.0060)	(0.0045)
N	24,381	24,381
Controls	Yes	Yes

Notes: Table 5 presents the effect of pre-test grandparental death on the teacher track recommendation. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. As the information on the teacher's track recommendation is not available for all children, this is a subsample of the 34,022 children who lost a grandparent during the three months before and after the track placement test. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

recommendation children receive.[17] The results show that experiencing grandparental bereavement increases the chance of receiving a vocational track recommendation by 1.59 percentage points, while it decreases the likelihood of an academic track recommendation by 0.77 percentage points. Hence, instead of compensating the lower test performance, teachers seem to recommend lower tracks for children in treatment group.

To test whether the children receiving a lower advice are also the ones performing worse on the test I look at the disparity between test outcomes and tentative teacher advice. If those children that perform poorly on the test are not the same children that receive a lower recommendation, I would expect to observe more often a misalignment between the test score and teacher advice. However, I do not find any difference in the frequency of disparities between the treatment and control group (see table A3 in the appendix). This suggests that teachers award lower recommendations to children who afterwards also perform worse on the test.

One explanation could be that due to losing a grandparent children display different classroom behavior. This may not only negatively influence their test score, but also their track recommendation when teachers mis-attribute the poorer classroom performance to lower child abilities instead experiencing distress. It is unlikely that any potential misattribution is caused by teachers being unaware of the child losing a grandparent. In an own-conducted survey among a representative sample of 1012 Dutch parents with children aged between 6 and 24 years old, I asked whether parents informed the school of their child after the loss of a grandparent. As 87.3 percent of parents answered affirmatively, it is unlikely that teachers are not informed when a grandparent dies.

Initial Track Placement Table 6 shows the consequences of the reduced test performance and teacher recommendation on initial track placement in seventh grade. The

[17]The definitive teacher track recommendation is unfortunately not available in the administrative data.

Table 6: Effect of grandparental death on initial track placement

	(1) Grade 7: Vocational	(2) Grade 7: Academic
Grandparental death	0.0087*	-0.0052
	(0.0046)	(0.0036)
N	34,022	34,022
Controls	Yes	Yes

Notes: Table 6 presents the effect of pre-test grandparental death on track placement in grade 7. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

estimates in column 1 show that experiencing grandparental bereavement shortly before the test leads to a 0.87 percentage point higher probability of being directly placed in the vocational track, compared to starting in the other tracks or a bridge class. Simultaneously, column 2 displays a decrease of 0.52 percentage points in the likelihood to start in the academic track, although it is not statistically significant. Even though the large share of children attending a bridge class in seventh grade partly blurs the picture, the findings are indicative that losing a grandparent at the end of primary school has negative effects at the beginning of secondary school.

As I do not observe the definitive teacher recommendation, I investigate whether the estimated increase in likelihood of going to the vocational track can solely be explained by the drop in test scores. When I regress test outcomes on vocational track placement for the entire population I find that a one standard deviation increase in test scores leads to a 21 percentage points lower probability to be directly placed in the vocational track (see table A4 in the appendix). Assuming that the effect is constant across the distribution, a 0.0293 standard deviation decrease in test scores corresponds to an increase of 0.62 percentage point of attending the vocational track. As I find an increase of 0.87 percentage point, this suggests that indeed the definitive teacher recommendation is lower for children in the treatment group, making it more likely that they attend the vocational track.

4.3 Long-Term Effects

In the long run, I investigate the effects on children's tenth grade track attendance and graduation performance. After initial track placement, children may under certain conditions change tracks during the first years of secondary school. Therefore, track switching is a way through which potential lasting negative consequences of pre-test grandparental death can be overcome.

Table 7: Effect of grandparental death on switching tracks

	Main tracks only		Main and sub-tracks	
	(1) Switch up	(2) Switch down	(3) Switch up	(4) Switch down
Grandparental death	0.0022*	0.0014	0.0047**	0.0025
	(0.0012)	(0.0021)	(0.0020)	(0.0025)
N	34,022	34,022	34,022	34,022
Controls	Yes	Yes	Yes	Yes

Notes: Table 7 presents the effect of pre-test grandparental death on switching tracks during the first four years of secondary school. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. Columns 1 and 2 look at switches solely between the three main tracks, while columns 3 and 4 also include switches between sub-tracks within the vocational track. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Track Switching Table 7 shows the effect of pre-test grandparental death on the probability to switch tracks during the first three years of secondary school. As treated children have an increased likelihood to initially be placed in a lower track, intuitively later on they may more often change to a track upward and less often to a downward track. Columns 1 and 2 show that children in the treatment group have a 0.22 percentage point larger probability to switch to a higher track than children in the control group, while there is no statistically significant difference in switching to a lower track. The effect size of 0.22 percentage points is not negligible since the population average of children changing to a higher track is only 3.9 percent. In addition, columns 3 and 4 allow for switches between sub-tracks, making the positive effect on upward track mobility even stronger with an increase of 0.47 percentage points.[18] Hence, some children in the treatment group seem to be able to counter the initial disadvantage by switching to a higher track at a later point in time.

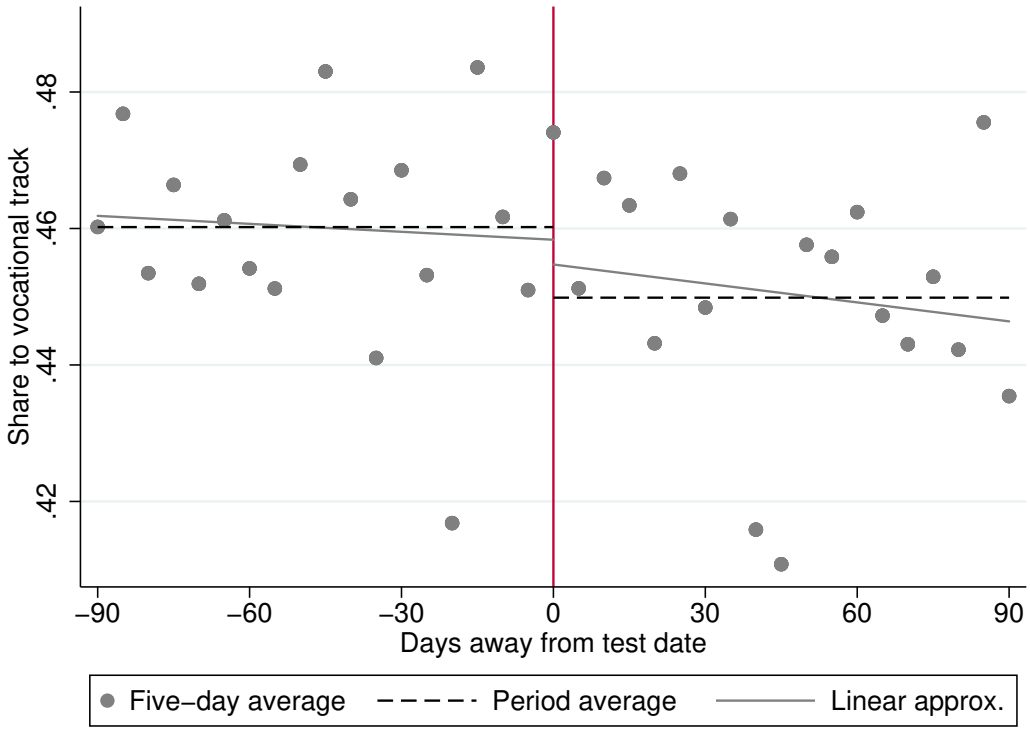
Track Attendance Figure 4 displays the raw shares of children attending the vocational track in tenth grade by time of grandparental death. The figure shows that children experiencing grandparental loss at an unfortunate time at the end of primary school still have a higher likelihood to attend the vocational track in tenth grade. The increase in upward track mobility seems to be insufficient to undo the negative effects on initial track placement.

Table 8 shows the regression outcomes of the impact of pre-test grandparental death on tenth grade track attendance. The track division in tenth grade has the advantage that it is not blurred by the existence of bridge classes anymore, this makes it possible to look at all three tracks separately.[19] Column 1 shows that children who experience grandparental

[18] Only the vocational track contains multiple sub-tracks.

[19] I focus on tenth grade instead of any higher grades, as grade 10 is the final grade of the vocational track.

Figure 4: Probability of attending the vocational track by time of grandparental death



Notes: Figure 4 shows the likelihood of attending the vocational track in tenth grade by time of grandparental death. The red vertical line indicates the time of the track placement test. The solid gray line shows the periods' time trends, while the dotted black line presents the periods' averages.

Table 8: Effect of grandparental death on track attendance

	(1) Grade 10: Vocational	(2) Grade 10: General	(3) Grade 10: Academic
Grandparental death	0.0108**	-0.0007	-0.0092**
	(0.0052)	(0.0050)	(0.0045)
N	34,022	34,022	34,022
Controls	Yes	Yes	Yes

Notes: Table 8 presents the effect of pre-test grandparental death on tenth grade track attendance. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

death before the standardized test have a 1.08 percentage points higher probability to attend the vocational track in grade 10, compared to the other two tracks. Simultaneously, treated children have a 0.92 percentage points lower probability to attend the academic track. As the effect sizes for the vocational and academic track are roughly the same, I do not see an effect on the middle track.[20] These findings show that despite that on average treated children more often switch to a higher track, there are still children who experience the negative consequences of the unfortunate timing of grandparental death four years after it happened.[21]

By extension, the tenth-grade findings translate into an increased likelihood to graduate from the vocational track for the early cohorts (see appendix table A5). When affected children on the margin now graduate from a lower track, they might perform better within their track as there is positive selection. Therefore, I investigate what happens to the outcomes of the centralized exams in Dutch and English at the end of secondary school. However, I do not observe an improvement in children's exam performance (see appendix table A5).

4.4 Heterogeneities

Not all children may respond the same to the death of a grandparent. In a first step I analyze whether the treatment effect on test performance differs by background characteristics or the intensity of family distress experienced by either children or parents. The regression estimates are displayed in appendix table A6. An important determinant of the level of distress is the bond children and parents have with the (grand)parent. In this

[20] Children who otherwise would attend the academic track move down one track, and a roughly equal amount of children move away from the general track to the vocational track, leaving the overall number of students in the general track the same.

[21] Intuitively, based on the track switching results one would expect the treatment effect size to decrease between grade 7 and 10. However, due to the existence of bridge classes this is not straightforward, see appendix section B for a detailed explanation.

respect, I consider whether a bereaved grandparent lived in the same municipality or is from the mother's side of the family, as daughters are often closer to their parents than sons (e.g. Bianchi, 2006).[22] However, these factors do not seem to influence the effect of grandparental death on test scores. A potential explanation for the lack of differences by proxies of distress, is that they may coincide with experiencing a heavier care burden towards the end of a grandparent's life. As this care burden is lifted after the grandparent dies, this may weaken or cancel out the negative consequences due to emotional distress after the death of a family member (Siflinger, 2017). In addition, the degree of distress could depend on the practical hassle that often follows after a death such as organizing the funeral or dividing the inheritance. These practical concerns are generally smaller in case there are more family members around to help. Therefore, I include interaction terms with indicators of whether there is a surviving partner or siblings of the parent present. Although the estimated coefficients hint indeed to weaker effects when there are more relatives around, they are not statistically significant. Furthermore, I interact the treatment dummy with background characteristics related to gender and socioeconomic status, as they may also influence how a child responds to the death of a grandparent. Again I do not find heterogeneous responses based on the child's gender, the grandparent's gender, having the same gender, single parenthood, low household income, or having a migration background.

Moreover, there may be heterogeneous treatment effects regarding the take up of mitigation possibilities. For example, in general we observe that children from advantaged families are more likely to switch tracks during secondary school than children from disadvantaged families. Therefore, as a second step I investigate whether a child's socioeconomic background influences if a child makes use of the makeup test, teacher recommendation or track switching after the loss of a grandparent. The results can be found in table A7 in the appendix. The point estimates suggest that after a grandparent dies children from more disadvantaged backgrounds - in terms of migration status, household income and single-parenthood - more frequently take the makeup test, while they are more often advised the vocational track and switch less often to higher tracks in secondary school. However, unfortunately the results are too noisy to make conclusive statements.

5 Robustness

There are several concerns with the empirical strategy that could influence the interpretation of the findings. First, the treatment effect may be underestimated if the control group experiences some degree of family distress at the time of the test, for instance when grandparents are already sick in the months prior to their death. As a robustness check I construct a control group which consists only of children who lost a grandparent from an unexpected cause of death. I assume that in the case of an unexpected loss children

[22] I assume both grandparents live together, and therefore only consider the grandfather's place of residence.

Table 9: Robustness analysis: treated control group

	(1) Total score	(2) Grade 10: Voc.	(3) Grade 10: Aca.	(4) Total score	(5) Grade 10: Voc.	(6) Grade 10: Aca.
Grandparental death	-0.0938***	0.0288**	-0.0331***	-0.0195**	0.0065	-0.0063
	(0.0269)	(0.0137)	(0.0122)	(0.0098)	(0.0050)	(0.0044)
N	4,773	4,773	4,773	35,150	35,150	35,150
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	Unexpected	Unexpected	Unexpected	One year lag	One year lag	One year lag

Notes: Table 9 presents several robustness checks with respect to the effect of pre-test grandparental death on the track placement test and grade 10 track attendance. The estimated coefficients are expressed in standard deviation in columns 1 and 4, and as average marginal effects in columns 2,3,5 and 6. Standard errors are clustered at mother ID level in parentheses. Columns 1 to 3 only include children who lost a grandparent due to an unexpected cause of death. In columns 4 to 6 the control group changed to having lost a grandparent one year after the test is taken. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

do not experience distress prior to the death of a grandparent. The first three columns of table 9 show significantly larger effect sizes on the test score and tenth grade track attendance after losing a grandparent unexpectedly. Test performance reduces by 0.0938 of a standard deviation, and the probability to attend the vocational (academic) track increases (decreases) by roughly 3 percentage points. An explanation for the stronger effects could be that now the control group no longer experiences distress at the time of the test, although alternatively the level of distress could be higher when a death is unexpected. Therefore, I conduct a second robustness check where the control group consists of children who lost a grandparent exactly one year after the treatment group. Since the control group now experiences the death of a grandparent a full year later, I assume that these children are not affected at the time of the test. The results are presented in columns 4 to 6 of table 9 and show actually smaller coefficients, making it unlikely that the effects of the main specification are greatly underestimated. However, the decrease of the effect sizes might partly be caused by the control group becoming slightly less advantaged than the treatment group.

A second concern is any unobserved selection bias that I fail to control for. For instance, children who lost a grandparent mere days before the test date but still participated, might be academically stronger, thereby potentially causing a selection problem. A similar reasoning holds true for children who lost a grandparent only days after the test took place. Table 10 presents results where I drop all children who lost a grandparent during the week before or after the test from the analysis. Columns 1 to 3 show that excluding these children does not significantly alter the point estimates. In addition, as I am unable to control for parental education I might be unaware of important unobserved heterogeneity related to socioeconomic status. Therefore, in columns 4 to 6 of table 10 I include additional controls for parental unemployment and social security usage. The findings are robust to including these indicators related to children's socioeconomic background. As a last check that accidental unobserved differences between the treatment and control group are not causing the results, I conduct a placebo test. I compare children who lose a grandparent four to six months after the test, to those losing a grandparent seven to nine months after the test. If my findings are solely caused by the difference in the timing of grandparental death, and not by random unobservable differences, I should not find an effect for this placebo test. The results are shown in columns 7 to 9, and indeed do not display any significant effects, which underlines the validity of the identification strategy.

A final concern relates to whether the time of grandparental death matters. In columns 1 to 3 in table 11 I extend the included time span from three to six months. The estimates show that doubling the time span reduces the magnitude of the negative effect on test score and grade 10 track placement by roughly a half. The findings indicate that the effects fade out over time, which is intuitive as grandparental death is a relatively mild event. In addition, I analyze whether there are interesting time patterns visible within the three-month period. Hence, in columns 4 to 6 I include month dummies. Although

Table 10: Robustness analysis: selection

	(1) Total score	(2) Grade 10: Voc.	(3) Grade 10: Aca.	(4) Total score	(5) Grade 10: Voc.	(6) Grade 10: Aca.	(7) Total score	(8) Grade 10: Voc.	(9) Grade 10: Aca.
Grandparental death	-0.0289***	0.0124**	-0.0085*	-0.0293***	0.0104**	-0.0096**	0.0095	-0.0012	0.0018
	(0.0105)	(0.0054)	(0.0047)	(0.0102)	(0.0052)	(0.0046)	(0.0104)	(0.0053)	(0.0046)
N	31,390	31,390	31,390	33,081	33,081	33,081	32,367	32,367	32,367
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specification	Donut	Donut	Donut	Add. cov.	Add. cov.	Add. cov.	Placebo	Placebo	Placebo

Notes: Table 10 presents several robustness checks with respect to the effect of pre-test grandparental death on the track placement test and grade 10 track attendance. The estimated coefficients are expressed in standard deviation in columns 1, 4 and 7, and as average marginal effects in columns 2,3,5,6,8 and 9. Standard errors are clustered at mother ID level in parentheses. Columns 1 to 3 only exclude children who lost a grandparent one week before or after the track placement test. In columns 4 to 6 I added controls for unemployment assistance, disability assistance and social security assistance. Columns 7 to 9 present the results of a placebo test where I compare children who lose a grandparent four to six months after the test, to those losing a grandparent seven to nine months after the test. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table 11: Robustness analysis: time patterns

	(1) Total score	(2) Grade 10: Voc.	(3) Grade 10: Aca.	(4) Total score	(5) Grade 10: Voc.	(6) Grade 10: Aca.
Grandparental death	-0.0153**	0.0038	-0.0044			
	(0.0073)	(0.0037)	(0.0033)			
Grandparental death: 0-1 months				-0.0158	0.0051	-0.0086
				(0.0139)	(0.0071)	(0.0062)
Grandparental death: 1-2 months				-0.0196	0.0125*	-0.0059
				(0.0140)	(0.0072)	(0.0063)
Grandparental death: 2-3 months				-0.0559***	0.0154**	-0.0136**
				(0.0148)	(0.0075)	(0.0065)
N	64,840	64,840	64,840	34,022	34,022	34,022
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	6 months	6 months	6 months	Dummies	Dummies	Dummies

Notes: Table 11 presents several robustness checks with respect to the effect of pre-test grandparental death on the track placement test and grade 10 track attendance. The estimated coefficients are expressed in standard deviation in columns 1 and 4, and as average marginal effects in columns 2,3,5 and 6. Standard errors are clustered at mother ID level in parentheses. Columns 1 to 3 include children who lost a grandparent six months before or after the track placement test. In columns 4 to 6 I included month dummies. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

all months show negative point estimates, the coefficient corresponding to a death two to three months prior to the test is largest and statistically significant. The children who lose a grandparent two to three months before the test face on average a reduction in test scores of 0.0559 of a standard deviation. This pattern is in line with figure 2, and can be partially explained by the time trends with respect to makeup test participation. In addition, worsened school behavior during the crucial months leading up to the test could play a role. Whereas, if a child loses a grandparent merely days before the test, all school work preparing for the test has already been done, potentially diminishing the negative consequences of grandparental death.

6 Conclusion

This paper shows that in a setting with high-stakes standardized testing, even mild events of family distress such as losing a grandparent, can have long-term repercussions on educational outcomes, thereby hampering equality of opportunity. I find that children who experience the death of a grandparental shortly before the standardized test obtain roughly 3 percent of a standard deviation lower test scores than children who lose a grandparent shortly after the test. The poorer test performance occurs despite the higher likelihood for treated children to take advantage of the makeup test, most likely because the overall take up rate remains minor. The subjective teacher's track recommendation fails to compensate children's poorer test performance, and even aggravates the negative impact as these children also receive lower track recommendations. Due to the poorer test scores and track recommendation, children in the treatment group have an increased chance to be placed in the vocational track at the start of secondary school compared to the general, academic or combined track. The possibility to change tracks during the first years of secondary school seems to allow some children to overcome the initial negative consequences of grandparental loss, as treated children are more likely to switch a track upward than their control-group counterparts. Nonetheless, it cannot prevent that there are children who four years after losing a grandparent still experience the negative consequences, as in tenth grade treated children have roughly a one percentage point higher chance to attend the vocational track instead of the general or academic track.

Although the effect sizes I observe are relatively small, their consequences can be large: in 2012 the difference in the yearly average personal income between children who stay on the vocational track versus the general or academic track amounts to €19,500 (CBS, 2014). Hence, there may be severe negative consequence for adult labor market outcomes when a child graduates from a lower track due to losing a grandparent shortly before the standardized test at the end of primary school. Further research is necessary to explore what causes one child to perform poorly after a grandparent dies, while another child's performance stays unaffected.

The results highlight an important drawback of employing high-stakes standardized tests: the weight that these tests put on performance at one moment at time, allowing even mild setbacks to have a lasting negative impact. This finding implies that in the case of high-stakes standardized testing, temporary shocks may create an uneven playing field between children who take the test. In this sense, the findings of this paper relate to a wider literature on the long-term consequences of idiosyncratic disturbances during high stakes tests. Examples are the worsening of air quality (Ebenstein, Lavy, and Roth, 2016), temperature (Park, 2019), or time of the day (Sievertsen, Gino, and Piovesan, 2016), which are found to negatively affect high-stakes exam results and by extension educational attainment and earnings. Hence, in the face of idiosyncratic events, standardized tests may provide a disproportional noisy measure of true ability, which can lead to inefficient and unequal educational decisions.

Finally, the results of this paper imply that the consequences of family setbacks are influenced by the prevailing educational policies. Therefore, when evaluating the fairness of educational practices, we should not only consider potential interactions with permanent background characteristics, but also take into account how they respond to temporary events of family distress. For one, the findings underline that not only the objective standardized test is influenced by a short-lived setback, but also the subjective teacher recommendation has problems separating children's inherent capabilities from the temporary consequences of the death of a grandparent. Moreover, early setbacks are not easily overcome, it seems difficult for children to redeem themselves, even with several educational policies in place that potentially can counter negative effects. As providing children the opportunity to switch tracks later-on proves to be partially effective, policies that allow for reevaluating children's capabilities might be more promising in setting initial setbacks right.

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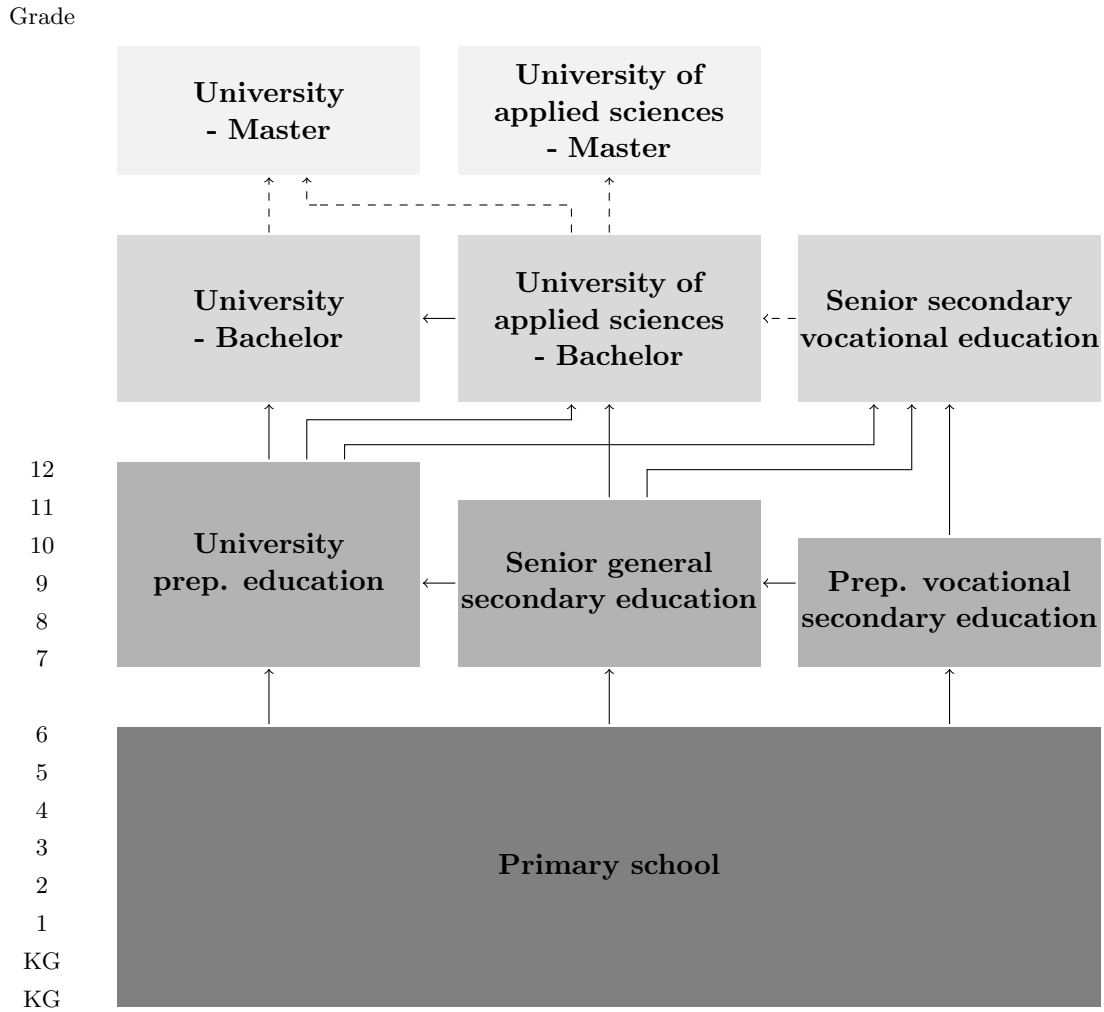
Appendix

A Tables and Figures

Figure A1: The Dutch education system



Notes: Figure A1 presents the education system in the Netherlands. The solid lines indicate that finishing a certain degree gives automatic permission to start the next degree. The dotted lines indicate transitions where additional conditions need to be fulfilled.

Table A1: Sample selection

	(1) Test participation	(2) Test participation
Grandparental death	-0.0055	-0.0055
	(0.0050)	(0.0038)
N	33,770	26,099
Controls	Yes	Yes
Specification	Unconditional	Conditional

Notes: Table A1 presents the effect of pre-test grandparental death on participation in the track placement test, i.e. being present in the baseline sample. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. Column 1 includes all children who were registered in 6th grade between 2008/2009 and 2013/2014 and lost a grandparent in the three months before or after the track placement test. Column 2 presents the effects conditional on the majority of the pupils in the school taking the track placement test. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income, siblings of mother and father. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A2: Balance tests

	Grandparental death	Grandparental death
Age	0.0043	0.0039
	(0.0051)	(0.0052)
Boy	-0.0006	-0.0009
	(0.0054)	(0.0055)
Migrant background	0.0067	0.0048
	(0.0098)	(0.0102)
Oldest child	0.0015	0.0002
	(0.0061)	(0.0062)
Mother's age	0.0015**	0.0014
	(0.0007)	(0.0009)
Grandfather died	-0.0052	-0.0036
	(0.0055)	(0.0056)
Grandparent from mother	-0.0073	-0.0056
	(0.0056)	(0.0057)
No. of children	-0.0001	-0.0004
	(0.0027)	(0.0027)
Single-parent	-0.0076	-0.0084
	(0.0100)	(0.0110)
Percentile disposable income	-0.0001	-0.0000
	(0.0001)	(0.0001)
Mother has siblings	-0.0037	-0.0041
	(0.0095)	(0.0097)
Father has siblings	-0.0129	-0.0180*
	(0.0091)	(0.0095)
Unemployment benefits - mother		-0.0148
		(0.0251)
Social assistence - mother		0.0191
		(0.0221)
Disability insurance - mother		-0.0052
		(0.0176)
Father's age		0.0003
		(0.0008)
Unemployment benefits - father		-0.0304
		(0.0247)
Social assistence - father		-0.0193
		(0.0311)
Disability insurance - father		0.0172
		(0.0200)
N	34,022	33,081

Notes: Table A2 presents the correlations between background characteristics and pre-test grandparental death. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A3: Discrepancy teacher advice and standardized test performance by treatment status

	Treatment	Control	Difference
Teacher advice ≠ test outcome (%)	29.12	28.81	-0.31
N	12,332	12,049	24,381

Notes: Table A3 shows the average share of children receiving a teacher recommendation that is not aligned with the track placement test outcome by treatment status. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A4: Effect of standardized test on initial track placement

	Grade 7: Vocational	Grade 7: Academic
Test score	-0.2067***	0.2298***
	(0.0003)	(0.0004)
N	1,101,571	1,101,571
Controls	Yes	Yes

Notes: Table A4 presents the correlation of the track placement test score on track placement in the vocational track in grade 7. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A5: Effect of grandparental death on graduation outcomes

	(1) Degree: Vocational	(2) Degree: General	(3) Degree: Academic	(4) Exam: Dutch	(5) Exam: English
Grandparental death	0.0135*	-0.0034	-0.0095	-0.0153	-0.0108
	(0.0077)	(0.0072)	(0.0066)	(0.0158)	(0.0150)
N	15,303	15,303	15,303	15,303	15,303
Controls	Yes	Yes	Yes	Yes	Yes

Notes: Table A5 presents the effect of pre-test grandparental death on track graduation and centralized exam scores. The estimated coefficients are expressed as average marginal effects in columns 1 to 3, and in standard deviations in columns 4 and 5. Standard errors are clustered at mother ID level in parentheses. Children who participated in the standardized test after 2011 are excluded as they did not graduate yet. The effects are larger than I observe in table 8, because of the selection of cohorts. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income, as well as for track in columns 4 and 5. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A6: Heterogeneous effects of grandparental death on track placement test outcomes

	(1) Total score	(2) Total score	(3) Total score	(4) Total score	(5) Total score	(6) Total score	(7) Total score	(8) Total score	(9) Total score
Gp. death	-0.0324**	-0.0273**	-0.0381*	-0.0810*	-0.0337**	-0.0206	-0.0351***	-0.0323***	-0.0297**
	(0.0130)	(0.0138)	(0.0206)	(0.0420)	(0.0142)	(0.0157)	(0.0107)	(0.0105)	(0.0106)
Gp. death*Same municipality	0.0059								
	(0.0205)								
Gp. death*Mother's side		-0.0047							
		(0.0202)							
Gp. death*Surviving partner			0.0114						
			(0.0237)						
Gp. death*Aunts/uncles				0.0552					
				(0.0432)					
Gp. death*Boy					0.0088				
					(0.0201)				
Gp. death*Grandfather						-0.0147			
						(0.0205)			
Gp. death*Single parent							0.0517		
							(0.0325)		
Gp. death*Low income								0.0354	
								(0.0358)	
Gp. death*Migrant									0.0044
									(0.0355)
N	34,022	34,022	34,022	34,022	34,022	34,022	34,022	34,022	34,022
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table A6 presents the heterogeneous effect of pre-test grandparental death on the track placement test. The estimated coefficients are expressed in standard deviations. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A7: Heterogeneous effects of grandparental death on makeup test participation, teacher recommendation and track switching

	(1) Makeup test	(2) Makeup test	(3) Makeup test	(4) Advice: Voc.	(5) Advice: Voc.	(6) Advice: Voc.	(7) Switch up	(8) Switch up	(9) Switch up
Gp. death	0.2646**	0.2866***	0.2748***	0.0685**	0.0691**	0.0638**	0.1486**	0.1601**	0.1579**
	(0.1048)	(0.1043)	(0.1028)	(0.0296)	(0.0295)	(0.0294)	(0.0631)	(0.0626)	(0.0629)
Gp. death*Single parent	0.2902			0.0427			-0.0919		
	(0.3145)			(0.0864)			(0.1885)		
Gp. death*Low income		0.1068			0.0306			-0.2357	
		(0.3237)			(0.0896)			(0.2012)	
Gp. death*Migrant			0.2722			0.0942			-0.1890
			(0.3653)			(0.0905)			(0.1941)
N	34,022	34,022	34,022	24,381	24,381	24,381	34,022	34,022	34,022
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table A7 presents the heterogeneous effect of pre-test grandparental death on the makeup test participation, teacher recommendation and track switching. The estimated coefficients are expressed as logit coefficients. Standard errors are clustered at mother ID level in parentheses. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

Table A8: Effect of grandparental death on track attendance excl. bridge classes

	(1) Grade 7: Voc.	(2) Grade 7: Aca	(3) Grade 8: Voc.	(4) Grade 8: Aca.	(5) Grade 9: Voc.	(6) Grade 9: Aca.	(7) Grade 10: Voc.	(8) Grade 10: Aca.
Grandparental death	0.0203***	-0.0158**	0.0188**	-0.0142*	0.0176**	-0.0158**	0.0177**	-0.0152**
	(0.0078)	(0.0074)	(0.0078)	(0.0074)	(0.0078)	(0.0074)	(0.0078)	(0.0072)
N	13,640	13,640	13,640	13,640	13,640	13,640	13,640	13,640
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table A8 presents the effect of pre-test grandparental death on track attendance in grades 7 to 10. The estimated coefficients are expressed as average marginal effects. Standard errors are clustered at mother ID level in parentheses. Children who were placed in a bridge class in grade 7 are excluded from the sample. All equations are controlled for the following covariates: children's age, gender, migrant background, birth order, number of siblings, mother's age, single-parent household, percentile disposable income. Significance levels: * p<0.1, ** p<0.05, *** p<0.01.

B Bridge Class Ambiguity

Some of the results presented in this paper may at first glance seem counterintuitive. On the one hand, I observe an increased treatment effect between seventh grade vocational track placement and tenth grade vocational track attendance. While on the other hand, I show that treated children more often switch to a higher track during secondary school, which would result in a reduction of the treatment effect. These contradicting findings can be explained by the presence of bridge classes in seventh grade. To illustrate how the presence of bridge classes may impact the development of the treatment effect across grades, I construct a hypothetical division of track attendance shares in grade 7 and 10 for the control and treatment group in table B1.

Table B1: Hypothetical track attendance shares in grade 7 and 10

		Voc.	Voc./Gen.	Gen.	Gen./Aca.	Aca.
Control	Grade 7	35	20	10	20	15
	Grade 10	45	0	30	0	25
Treatment	Grade 7	36	21	10	19	14
	Grade 10	46.5	0	30	0	23.5

In this hypothetical scenario I make two assumptions. First, in seventh grade treated children are more often placed in a bridge class that combines the vocational and general track, instead of the general with the academic track, than the control group. Second, half of the children in a bridge class end up in the lower track of the two, and half in the higher track. Accordingly, the treatment effect in grade 7 is a 1 percentage point increase (decrease) in the likelihood to be placed in the vocational (academic) track. While in grade 10 the treatment effect is respectively a 1.5 percentage points increase (decrease). The track indicators in seventh grade do not take into account that potentially more children are in lower bridge classes, while this effect is captured in grade 10. Therefore, even in the light of increased upward track switching, the seventh grade coefficients can be smaller than the ones in tenth grade.

Unfortunately I cannot check this hypothesis as the data contains no information on the type of bridge class a child attends. However, as a sanity check I look at the development of the treatment effect between grade 7 and 10 excluding children who started seventh grade in a bridge class. In table A8 I indeed observe a decreasing trend of the treatment effect from grade 7 to grade 10, which is in line with treated children switching more often to a track upwards.