How Important is it With Whom You Go to School? The Relationship between Immigrant Peers and Educational Success Across The Entire School Career of Native and Immigrant Students

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Abstract

School immigrant concentration and its relationship with educational outcomes has risen high on political and scientific agendas. Therefore, in this study we analyze how immigrant peer composition affects the educational outcome dropout amongst native and immigrant students. We provide new evidence on the potential mechanisms driving this relationship. The context of our empirical analysis is a socio-economically disadvantaged city in the Netherlands with high dropout rates. We analyze administrative panel data with around 80000 observations and apply fixed effects models to account for endogeneity problems. We find a higher share of immigrant peers in a school increases the dropout probability for natives and immigrants. This relationship is non-linear and very much driven by second-generation immigrant peers. In a second part of the analysis, we take a longitudinal perspective and simultaneously account for immigrant shares in primary and secondary and find that some long-lasting effects of immigrant peers on dropout probabilities.

Keywords: Inequality; immigrant peers; educational outcomes; longitudinal analysis

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Introduction

Against the background of an increasing influx of non-European immigrants in many Western countries (Hardoy, Mastekaasa, & Schøne, 2018; Jensen & Rasmussen, 2011), school immigrant concentration and its relationship with educational outcomes has risen high on political and scientific agendas. On top of their often socio-economically disadvantaged backgrounds, many non-native students lack proficient language skills of the host country, which makes following classes extremely difficult for many of them (Card & Rothstein, 2007; Tonello, 2016). Despite insufficient language skills and potential difficulties with assimilation, immigrants students also face academic disadvantage because they enter an unknown school system (Peguero, Bondy, & Hong, 2017; Tonello, 2016). These conditions require special or additional attention from teachers and educators (Tonello, 2016); these resources cannot be devoted to native students.

A large body of literature has shown that school ethnic composition is an important determinant of students' achievement (Coleman, United, Office of, & National Center for Education, 1966). However, with respect to how the presence of immigrant students affects the educational outcomes of natives the evidence is mixed. Some studies refer to a negative influence of non-natives on the educational outcomes of natives (Ballatore, Fort, & Ichino, 2014; Contini, 2013; Gould, Lavy, & Daniele Paserman, 2009; Jensen & Rasmussen, 2011). Other studies find no or negligible effects (Geay, McNally, & Telhaj, 2013; Ohinata & Van Ours, 2013). The underlying mechanisms of these peer interactions remain widely unclear (De Giorgi & Pellizzari, 2014; Tonello, 2016).

Peer interactions are likely to depend on the time immigrants have already spent in the hosting country (Peguero et al., 2017). Furthermore, different levels of integration affect peers differently. A major determinant for immigrants' integration is whether they were born in the host country (i.e. are descendants of immigrants; second-generation immigrants) or immigrated themselves (first-generation immigrants) (Cebolla Boado, 2007; Chiswick & DebBurman, 2004; Jensen & Rasmussen, 2011; Ohinata & Van Ours, 2013; Schneeweis, 2011; Tonello, 2016).

Another determinant of immigrant peer effects is the extent to which students are actually interacting with immigrant peers across their school careers. In general, such *long-term* or *continuing* school effects are hardly studied (Creemers, 2010; Teddlie & Reynolds, 2000; Vanwynsberghe, Vanlaar, Van Damme, & De Fraine, 2017) and, so far, only one study has examined the impact of immigrant concentration during elementary school on the long-term academic outcomes of native students in high school (Gould et al., 2009). This study did account for immigrant composition in primary but not in secondary school. Moreover, it focused exclusively on the outcomes of natives and did not identify how school composition affects immigrant educational outcomes. Given the rapid increase in the number of immigrant students this group is becoming an increasingly relevant group.

In this study, we present an analysis of how immigrant peer composition affects the educational outcome dropout amongst the groups of native and immigrant students. The context of our empirical analysis is a socio-economically disadvantaged city in the Netherlands. We analyze administrative panel data and

can thereby make a number of contributions to the existing literature. Our first aim is to provide new evidence on the relationship between the share of immigrant peers and dropout and to examine the linearity of this relationship. Second, we want to disentangle how first- and second-generation immigrant peers separately affect the dropout risk of natives and immigrant students. The third aim is to identify the extent to which school immigrant composition affects dropout at different moments of educational careers and how ethnic school composition affects educational outcomes of immigrants and natives in the short and medium run. Therefore, we consider the share of immigrant peers from primary to the end of secondary education. This allows us to capture the dynamic nature of immigrant peer composition across school years.

Towards a conceptual framework

Negative vs. no effects of immigrant shares on educational outcomes

The literature on the relationship between immigrant school composition and educational outcomes has mostly considered natives and has revealed mixed results. Studies in a variety of contexts and using different measures did not find any effect (Cebolla-Boado & Garrido Medina, 2011; Chachashvili-Bolotin, Lissitsa, Shavit, & Ayalon, 2016; Geay et al., 2013; Hardoy et al., 2018; Ohinata & Van Ours, 2013). Others found weak negative (Contini, 2013; Diette & Uwaifo Oyelere, 2017; Tonello, 2016) or mixed effects (Cebolla Boado, 2007; Seah, 2016). Yet, there is also a considerable number of studies pointing towards negative effects of a larger number of immigrants on the educational performance of natives (Brunello & Rocco, 2013; Gould et al., 2009; Hu, 2018; Mickelson, Bottia, & Lambert, 2013; Speciale, 2012; Tonello, 2016). There are several reasons for these different results. A variety of populations (e.g. primary and secondary), samples, contexts and outcomes that have been analyzed on those studies explain a large part of the different findings across the studies.

Few studies have analyzed how immigrant peers affect the educational outcomes of other immigrants. The results from studies have analyzed the outcomes of both natives and immigrants (Agirdag, Van Houtte, & Van Avermaet, 2012; Maestri, 2017; Schneeweis, 2015; Szulkin & Jonsson, 2007) are mixed. For example, focusing on primary education in Belgium Agirdag et al. (2012) found no effect of ethnic composition on neither natives' or immigrants' mathematics achievement. Maestri (2017) analyzed primary schools in the Netherlands and found that ethnic diversity has a positive impact on the test scores of minority students, in particular for language skills; while it does not have a significant effect on natives' language skills. The results from a study on Austrian panel-data draws a somewhat different picture: Schneeweiss (2015) finds that native students are not affected by the share of immigrant students, while immigrant students are affected adversely.

Overall, natives and immigrants are affected differently by immigrant peers. The literature also suggests that the relationship between immigrant shares and educational outcomes is complex and that a multitude of factors play a role.

Distinguishing first and second generation immigrants

US-studies have traditionally focused on achievement gaps between ethnic minority students (blacks and Hispanics) and white students, while the European literature focuses primarily on first-generation immigrants (Tonello, 2016). Previous studies differ regarding the treatment of first- and second-generation immigrants in their measure of immigrant shares (Hardoy et al., 2018). First-generation immigrants immigrated to the destination country themselves; second-generation immigrants are the children of immigrants. Some measures include both generations (e.g. Demanet & Van Houtte, 2014; Hermansen & Birkelund, 2015; Veerman & Dronkers, 2016), others only consider first-generation immigrants (Gould et al., 2009) and another stream of studies uses separate measures for first- and second-generation immigrants (Cebolla Boado, 2007; Contini, 2013; Hardoy et al., 2018; Ohinata & Van Ours, 2013; Szulkin & Jonsson, 2007; Tonello, 2016). Others consider the educational outcomes for children from both generations separately (Cortes, 2006; Jensen & Rasmussen, 2011). These studies show that it is important to consider both immigrant generations independently.

In a study on Dutch primary education Ohinata and Van Ours (2013) find weak negative spill-over effects from the presence of immigrant children on natives' academic performance when they only consider the share of first-generation immigrants. Once they include second-generation immigrants in their analysis the effects of the share of immigrant children on science and mathematics test scores are more positive, while it does not make a difference for reading test scores (Ohinata & Van Ours, 2013). Szulkin and Jonnson (2007) find the proportion of first-generation immigrant pupils in a school to depress grades in general, but particularly for other first-generation immigrant. The proportion of second-generation immigrants does not affect the outcome. They further conclude that the effect of ethnic density on grades is weak in schools with less than 40 per cent first generation immigrants, beyond that point, there is a fairly strong negative marginal effect.

Jensen and Rasmussen (2011) analyze how school immigrant concentration in Denmark affects the outcomes of first- and second generation immigrants differently. They find that controlling for the immigrant concentration non-Western first-generation immigrants have significantly lower reading test scores than native children.

Different potential mechanisms may explain how first and second generation immigrants affect educational outcomes of their peers. More specifically, why should we expect the adverse peer-effects of first-generation students to be stronger those that of second-generation students? First of all, being born in the host country bears several potential positive effects (i.e. second generation immigrant) as this allows for an early socialization in the receiving context (Cebolla Boado, 2007; Chiswick & DebBurman, 2004). Compared to second-generation immigrant students, first-generation immigrant students are often less integrated and are also more likely to lack linguistic competencies (Ohinata & Van Ours, 2013; Schneeweis, 2011; Tonello, 2016), also because in most cases they have not been in the host countries' school system throughout their full school career (Jensen & Rasmussen, 2011). Therefore, negative immigrant concentration effects on peers, amongst others due to insufficient

language skills, are more likely to come from the first-generation immigrant density (Hardoy et al., 2018).

On the other hand, in many countries, such as the Netherlands, the absolute number of second-generation immigrant students is larger than that of the first-generation immigrant students (Ohinata & Van Ours, 2013). Overall, this may result into stronger effects.

School immigrant compositions throughout educational careers

Most studies have used cross-sectional data to estimate the effects of school immigrant concentration on educational outcomes (e.g. Agirdag et al., 2012; Dronkers & van der Velden, 2013; Jensen & Rasmussen, 2011). Yet, a growing body of literature is based on longitudinal data (e.g. Bygren & Szulkin, 2010; Frattini & Meschi, 2017; Gould et al., 2009; Hardoy et al., 2018). Longitudinal data is valuable in this context because it allows controlling for the dynamic nature of school composition over time.

For most of these studies, the aim of using longitudinal data is to be able to approach causality, while the main interest of these types of studies does usually not reside in the interest of disentangling the effects/role of earlier experiences throughout education. One exception it the study of Gould et al. (2009), which was set in the Israeli context and used a quasi-experimental design with the objective of examining the impact of immigrant concentration during elementary school on long-term academic outcomes of native students in high school[2]. They found that the presence of immigrant concentration had an adverse effect on the chances of natives' passing the high school matriculation exam.

Two potential mechanisms may explain the more important role of respectively primary and secondary exposure on secondary school outcomes. On the one hand, there is some evidence that primary school educational experiences affect later school outcomes (Vanwynsberghe et al., 2017)[3]. For example, Goldstein and Sammons (Goldstein & Sammons, 1997) found that the primary school impact on achievement at age 16 was larger than the secondary school impact. On the other hand, more recent experiences may have a stronger impact. In a recent study Hicks and colleagues (2018) have analyzed how cumulative exposure to neighborhood disadvantage and recency of exposure related to children's test scores. They find that children who were more recently exposed to neighborhood disadvantage had significantly lower scores on reading and math tests compared with those who were exposed further in the past and conclude that recency of exposure to disadvantaged neighborhoods may be more important for children's test scores than average exposure. If the same holds true for school contexts, secondary school immigrant concentration should be a stronger predictor for secondary school outcomes than exposure during primary education. Hicks et al. (2018) suggest that studies of child development should consider both average cumulative neighborhood exposure and the timing of this exposure. Relating this to school compositions considering different points in time instead of simply (or on top of) looking at averages may help further unfold how immigrant school concentration affects educational outcomes.

[2] Gould et al. focused on primary education only and only considered the outcomes of natives.
[3] Check references therein and use for explaining our results.

Immigrant shares versus numbers of different ethnicities

Instead of focusing on the share of immigrants in a school, another stream of the literature has analyzed the impact of ethnic diversity on test scores, in addition to the effect of the share of non-native pupils (Maestri, 2017; Veerman & Dronkers, 2016). This measure is closely related to immigrant shares, but conceptually different in the sense that is allows accounting for the heterogeneity of the immigrant group (Maestri, 2017); measures of immigrant shares do ignore this heterogeneity.

Theoretically, ethnic diversity may affect learning and educational outcomes both positively and negatively and the effects are likely to differ for natives and immigrants. Ethnic diversity may positively impact immigrants' educational outcomes because it may strengthen their incentive to adopt the instructional language (language proficiency hypothesis) and culture (Maestri, 2017). The *diversity enriching* hypothesis stipulates that ethnic diversity stimulates students' interests (Lazear, 1998; Ottaviano & Peri, 2006). Different ethnic groups can contribute different skills and thereby increase overall productivity (Maestri, 2017). Ethnic diversity has also been argued to stimulate creativity.

Yet, ethnic diversity may also affect peers negatively. One reason is that it may hamper interactions between peers (Maestri, 2017). Ethnic diversity can lead to problems for teachers in the teaching process and thereby reduce the efficiency of teaching (referred to as the *teachers' effectiveness* hypothesis) (Maestri, 2017). For example, dealing with langue problems of one minority ethnic group is easier than having to target specific instructional time to different groups. Teachers may be overburden by heterogeneous ethnic class compositions. Moreover, linguistic and other difficulties experienced by non-native students may have negative spillovers on native students (Maestri, 2017).

Maestri (2017) analyses Dutch primary schools and finds a positive effect on the test score of immigrant children, particularly for language skills; native students are not affected. This confirms the *language proficiency* hypothesis: diversity boosts language assimilation and she suggests that the presence of more and smaller ethnic minority groups could work as an incentive for language proficiency. Her study also hints to some evidence for a negative relationship between ethnic diversity and immigrants' social integration. She suggests that these mixed results are consistent with the *ethnic identification* hypothesis; putting forward a trade-off between leisure and time for studying. In her study, the *teachers' effectiveness* and *diversity enriching* hypotheses are not confirmed.

Veerman et al. (2016) have developed a diversity indicator for the level of diversity given a particular share of migrant children. This indicator is negatively related to reading comprehension in Grade 8 in Dutch primary education. For other grade years, we find little support for negative effects of diversity net of the share of migrants in a class.

The research context

Immigrants and immigrant concentration in Dutch education

Migrants moved to the Netherlands mainly because of three reasons. Firstly, post-war migration, between the middle of the 1940s to the 1970s was dominated by immigrants from (former) colonies.

These include migrants from Indonesia, Molucca, Surinam, and Antilles. Secondly, in the 1960s and 1970s foreign workers were recruited as guest workers from guest worker recruitment countries in southern Europe and particularly from Morocco and Turkey. The recruitment stopped around the 1980s but further migration from these two countries on the basis of family formation or family unification continued. Finally, in more recent years the inflow political refugees and asylum seekers from diverse backgrounds such as Iraq, Iran, Afghanistan and Somalia has increased (Ohinata & Van Ours, 2013).

In this study, immigrant students are students that are born abroad or have at least one parent being born abroad (Statistics Netherlands, 2016). First and second generation immigrants are distinguished: An individual that was born abroad is a first generation immigrant, while an individual that was born in the Netherlands but has at least one parent that was born abroad is a second generation immigrant (Statistics Netherlands, 2016). A further distinction is made between Western and Non-Western migrants.[4] Most statistics and research focuses on Non-Western migrants since they generally have a disadvantaged socio-economic position.

In the Netherlands, more than half of the immigrants are non-Western immigrants, and most of them are from Turkey, Morocco, Surinam and the Antilles. Generally these Non-Western groups are found to have disadvantaged socio-economic position with regard to education and occupational level, wage, unemployment, welfare dependency and neighborhood context (Dagevos, 2001; Huijnk, Gijsberts, Dagevos, & en, 2013).

Differences between these four largest Non-Western immigrant groups regarding their socio-economic position are observed as well. Overall, Turkish and Moroccan immigrants find themselves in a more disadvantaged position compared to immigrants from Surinam and the Antilles (Dagevos, 2001; Huijnk, Gijsberts & Dagevos, 2013). Nonetheless, more recent reports show that differences between these Non-Western immigrant groups as well as between the different groups seem to be diminishing with regard to education. However, with regard to their disadvantaged position on the labour market, even with the positive developments regarding education, seems to be maintained (Huijnk & Andriessen, 2016).

Cornering the social and cultural integration a comparable distinction is observed between the four immigrant groups. Turkish and Moroccan migrants have a larger social and cultural distance compared to immigrants from Surinam and Antilles (Dagevos, 2001). While there are large fluctuations in trends overall there have not been a lot of changes with regard to contacts with ethnic Dutch (social integration) and only small changes in their opinions about gender roles and homosexuality (Huijnk & Andriessen, 2016). The observed differences between the two groups (immigrants from Turkey or Morocco vs. immigrants from Antilles and Surinam) can most probably be explained by the differences in immigration background. Immigrants from former colonies (Antilles and Surinam) are more familiar with Dutch language and culture.

[4] Non-Western immigrants are defined by Statistics Netherlands as immigrants from Africa, Latin-America, Asia (except Indonesia and Japan) or Turkey.

The setting

The setting of this study is a municipality in the eastern region of Amsterdam, the Netherlands. It is the seventh largest Dutch municipality[5]. The municipality is a "new town", i.e. a town constructed to stop suburbanization after the Second World War. New towns are located close to large cities (Haelermans & De Witte, 2015). Historically, new towns were supposed to stop housing and resource shortages and provide commuting possibilities (Hall & Tewder-Johnes, 2010). They are heavily subsidized and low and medium priced houses (MinVROM, 2000). Residents are mostly low and middle income families (Kristof De Witte, Van Klaveren, & Smets, 2015). Previous research indicates that new towns have a population that does not constitute the average town population in the Netherlands. There is a larger share of immigrants, single parents, and lower educated parents (K. De Witte, Van Klaveren, & Smets, 2011; Ledoux, 2011). In new towns, educational attainment is lower and dropout rates are higher than the Dutch average (Education Inspectorate, 2010).

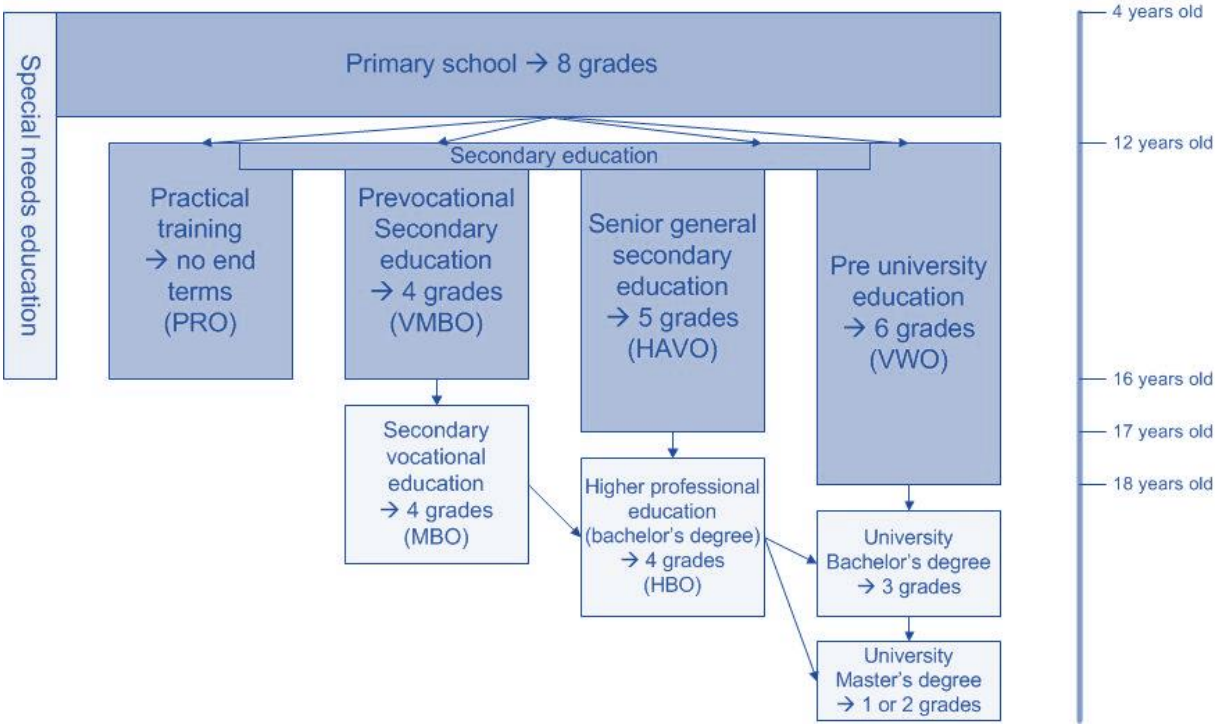
There is a relatively large share of immigrants in this municipality, as they are often middle and lower class people, who were the ones with a higher likelihood of moving into this municipality. Often, even if the student officially has the Dutch nationality, at least one of the parents has another nationality, leading to an interesting and diverse mix of ethnicities and nationalities in this municipality.

Particularities of the Dutch educational system

The Dutch educational system has three important particularities. First, it has a tracking system in secondary education (see Figure 1). In the Netherlands, pupils attend primary education between ages 4 and 12 and secondary education until a higher secondary degree is obtained. Based on a standardized national test and a recommendation given in elementary school students are tracked in secondary education.[6] Secondary education starts in 7th grade when students are on average 12 years old. Four different levels of education are offered: 1. practical training education, 2. prevocational secondary education, 3. general upper secondary education and 4. pre-university education. Depending on the level of education, secondary education takes four to six years. Within tracks, students choose a specialization. In upper secondary school – consisting of general upper secondary and pre-university education – they choose between a culture and a nature specialization. In (pre-)vocational education between a health, economics, agriculture and technical specialization.

[5] 195,000 inhabitants.
[6] Referred to as *ability tracking*.

Figure 1: The Dutch educational system (authors' own composition)



A second particularity is track repetition. Because of the tracking system, students must meet the level of the track for *all* subjects. If they perform badly at three or more subjects[7], they cannot continue to the next year, leading to grade repetition, being placed back a level, to a lower track or dropping out. Grade repetition, often combined with downgrading one track, is very common. Almost half of the students repeat a grade (Vuuren & Wiel, 2005), with almost two thirds in secondary education. Upward mobility between tracks is not common.

The third characteristic is "free school choice". Students do not have to live in a particular catchment area in order to be eligible to attend a school in that area. As for primary school, almost all students attend the nearest school. Students receive secondary school level advice from their primary school, but usually the same educational track is offered by several schools. Students can choose a particular secondary school. Usually, they choose a school nearby, and in many cases this is the nearest school. The latter also depends on the tracks that are offered at the nearest school and which school their friends attend.

School dropout in the Netherlands

The educational outcome considered in this study is dropout. In line with the European definition, a youngster up to the age of 23 is considered a dropout if he or she is no longer in education and did not obtain a higher secondary degree (European Commission, 2010). In the Netherlands, 2.9% students dropped out of school during the school year 2010/2011. With 4.1% in the same school year the municipality under study has one of the highest percentages of dropout rates throughout the country.

[7] Note that the exact maximum number of insufficient grades depends on the track and grade level for students to be allowed to the next grade level. The median is three.

The high numbers of early school leaving made European policymakers decide making dropout a main priority in the Horizon2020 targets. In the Netherlands, various policy interventions aim to reduce early school leaving (for a discussion of the interventions see Cabus & De Witte, 2011; Kristof De Witte & Cabus, 2013).

Hypotheses

Based on the conceptual framework and within the above-described context, in the empirical analyses we will test the following hypotheses.

Hypothesis 1: *A higher share of immigrants has a negative and non-linear effect on natives and immigrants.*

Hypothesis 2: *The negative effect on natives and immigrants is driven more by first- immigrants than by second-generation immigrants.*

Hypothesis 3: *The immigrant shares in primary and secondary education both play a role.*

Hypothesis 4: *There is a generation effect in primary and secondary education.*

Data and descriptives

We use a panel dataset with all students who attend one of the 11 primary and 18 secondary schools in the municipality between 2005 and 2010. We consider each student in each year. Here, we present the analyses of two sub-samples one for all students consisting of 79514 observations referring to 21065 students. For examining the longitudinal effects on peer immigrant share in primary and secondary school we use a sub-sample of students that are in the correct age range so that information on both is available. This dataset consists of 41792 observations referring to 11724 students. In addition, we have run the analyses for a sample of students in vocational education (52889 observations, referring to 12093 students), the results are not presented here but can be obtained from the authors.

Estimation strategy

Revealing causal effects of immigrant peer composition is difficult as it is also a result of parental choices and sorting into schools (Card & Rothstein, 2007; Cebolla Boado, 2007; Geay et al., 2013; Hu, 2018; Ohinata & Van Ours, 2013). Students may sort into schools, particularly in the Netherlands where the concept of freedom of school choice is applied. The immigrant student proportion may even lead to student mobility of students across schools (white flight; Betts & Fairlie, 2003; Hu, 2018; Lavy, Paserman, & Schlosser, 2012). Therefore, educational outcomes may not be driven by immigrant peer effects, but may result from sorting behaviors (Geay et al., 2013; Manski, 1993). Given the potential self-selection OLS estimates are likely to be biased if unobserved confounders are not accounted for. In the literature, two empirical strategies are employed. Either random assignment to schools is exploited or it is assumed that peer composition to be randomly determined after controlling for school fixed effects (e.g. Bygren & Szulkin, 2010; Diette & Uwaifo Oyelere, 2017; Hardoy et al., 2018; Hoxby,

2000; Hu, 2018; Ohinata & Van Ours, 2013; Schneeweis, 2015; Tonello, 2016). To deal with the potential selectivity across time and schools and to exclude endogenous variation, we follow the second methodology and use fixed effects. The basic model is:

$$y_{icsy} = ß_0 X_{ics} + ß_1 I_{icsy} + \mu + l + trend + \varepsilon_{icsy}$$

We include time, cohort (μ) and school-grade (l) fixed effects. Moreover, to control for a time trend, we also include year fixed effects (*trend*). To account for the panel structure standard errors are clustered at the student level. The school fixed effects capture unobservable school characteristics that are constant over time; for example, the school building, school facilities and other unobserved characteristics that may be correlated with both the ethnic composition and academic achievement (Schneeweis, 2015).

y is the binary outcome, dropout observed for individual i, in cohort c, in school s, in school year y, that either takes the value 1 if the student drops out and 0 if the student does not drop out.

X_{icsy} captures observable characteristics of students, cohorts, and schools. At the student level, we control for gender, age, immigration generation (dummy variable for each first and second generation) and if 0, 1 or 2 parents are non-Dutch. We also control for individuals' ethnicity (Dutch, Antillean, Suriname, Turkish, Moroccan, African, other non-Western, other Western). We also account for family size. In order to control for families' socio-economic status, we control for their housing value. This has been used by earlier studies as a proxy for families financial and cultural capital. At the cohort level, we control for the grade level and track of education (also sometimes referred to as educational programme fixed effects), this can be considered a proxy for students' ability, in particular in combination with their age. At the school level, we control for school-size and the proportion of girls in the school.

I_{icsy} is the respective coefficient of interest and represents our measures for presence of immigrants in schools. ε_{icsy} is the idiosyncratic error term. As suggested in the conceptual framework we use different measures to analyze the relationship between the presence of immigrants and dropout: the average share of all immigrants in their current school, the average share of immigrants in primary education as well as shares for primary and secondary education separately. As a control variable we use a measure of ethnic diversity (defined as the number of ethnicities in an individuals' school, grade level and track per year). To account for non-linear effects we also analyze quadratic and cubic functions of the share measures (Hardoy et al., 2018; Tonello, 2016).

Dropout

Dropout rates differ considerably according to respondents' age. At age 14 only .02% have experienced dropout, this increases to around 4% for 18 year-olds and up to almost 14% for 21-year-old students.

Results

Table 1 shows the results for the estimation of the fixed effects models. In *Panel A* we present the results for the relation between a higher immigrant share and dropout. For all students, native students and immigrant students we find that a higher share of immigrant students is related to a higher dropout risk. *Panel A* further shows that the square of the immigrant share has a negative coefficient which points to

a marginally increasing relationship of the share of immigrants on a higher dropout probability of the full student population.

Next, we consider the share of first- and second-generation immigrants separately. *Panel B* indicates that for all students and native students the dropout risk decreases with a higher share of first generation-immigrants, but increases – and more strongly – with a higher share of second-generation immigrants. For immigrant students the share of second-generation immigrants is related to a higher dropout risk as well, but the share of first generation immigrants is not significant.

In the following steps of the analysis, we consider a subsample for which information on immigrant share in in primary education is available in addition to that for secondary. Despite the smaller sample size some significant results are found. Panel C shows that for natives a higher immigrant share in primary education is related to a higher dropout risk in secondary education, while the share in secondary education is not significant. For all students and immigrants neither is significant.

Finally, we are interested in the interplay of immigrant shares by generation across education levels and present the results in Panel D. We find that for the full population none of the measures is significant. For natives the share of second-generation immigrants in primary education is related to a higher dropout risk. For immigrant students a different picture emerges: They experience a higher dropout risk if there is a higher share of second-generation immigrants in secondary school; the other measures are not significant.

Table 1: Results from the fixed effects estimation (Coefficients, standards errors in parentheses)

	All students	Native students	Immigrant students
Panel A			
Overall immigrant share	0.059	0.058	0.056
	(0.016)***	(0.021)**	(0.0271)*
R^2	*0.042*	*0.039*	*0.043*
Overall immigrant share	0.229	0.152	0.232
	(0.050)***	(0.058)**	(0.101)
Overall immigrant share^2	-0.244	-0.144	-0.227
	(0.066)***	(0.085)	(0.121)
R^2	*0.043*	*0.039*	*0.043*
Panel B			
First-generation immigrant share	-0.086	-0.125	-0.059
	(0.040)*	(0.042)**	(0.049)
Second-generation immigrant share	0.137	0.142	0.123
	(0.023)***	(0.027)***	(0.033)***
R^2	*0.044*	*0.042*	*0.044*
Panel C			
Immigrant share primary education	0.011	0.022	0.001
	(0.006)	(0.009)*	(0.009)
Immigrant share secondary education	0.024	0.016	0.056
	(0.022)	(0.032)	(0.034)
R^2	*0.030*	*0.028*	*0.044*
Panel D			
First-generation immigrant share in primary education	0.055	0.015	0.082
	(0.030)	(0.028)	(0.048)
Second-generation immigrant share in primary education	0.000	0.022	-0.021
	(0.008)	(0.011)*	(0.012)
First-generation immigrant share in secondary education	0.003	-0.007	0.016
	(0.045)	(0.060)	(0.076)
Second-generation immigrant share in secondary education	0.024	0.001	0.089
	(0.022)	(0.031)	(0.037)*
R^2	*0.030*	*0.027*	*0.047*

* p<0.1, ** p<0.01, *** p<0.001

Conclusions and discussion

Against the background of an increasing influx of non-European immigrants in many Western countries (Hardoy et al., 2018; Jensen & Rasmussen, 2011), school immigrant concentration and its relationship with educational outcomes has risen high on political and scientific agendas. Therefore, in this paper we present the results of an analysis of how immigrant peer composition affects the educational outcome dropout amongst the groups of native and immigrant students. With our study we provide new evidence on the potential mechanisms driving this relationship. The context of our empirical analysis is a socio-economically disadvantaged city in the Netherlands. In order to shed light on that question we have analyzed administrative panel data and tested four hypotheses. First, we have hypothesized that a higher share of immigrants has a negative on natives and immigrants. Our results confirm this hypothesis. We further expected this relationship to be non-linear, which has been confirmed for the full-population but not for the separate samples for natives and immigrants. So, there is a marginal increasing relationship between the share of immigrants on the likelihood to dropout. Overall *hypothesis 1* is confirmed. Our *second hypothesis* was that the negative effect on natives and immigrants is driven more by first-immigrants than by second-generation immigrants. This has not been confirmed. On the contrary, we find that a higher of second-generation immigrants relates to more dropout for all students, natives and immigrants. In addition, for the full sample and for natives we find that a higher share of first-generation immigrants is negatively related to dropout, hence, there is a reduced dropout probability. With *hypothesis 3* we have tested whether immigrant shares in primary and secondary education both play a role with respect to higher dropout probabilities. This has not been confirmed: only the immigrant share in primary education predict more dropout for natives. Finally, we have formulated *hypothesis 4* and tested if the generation effect is significant in primary and secondary education. Overall, we do not find support for hypothesis 4 either. For natives we find that higher share of second-generation students in primary education related to a higher dropout probability of natives. For immigrants a higher dropout probability is observed if they are exposed to a higher share of second-generation immigrants in secondary education.

Overall, our results confirm a number of studies showing that a higher share of immigrants is related to negative effects on educational outcomes of natives (Brunello & Rocco, 2013; Gould et al., 2009; Hu, 2018; Jensen & Rasmussen, 2011; Mickelson, 2014; Speciale, 2012) and as indicated by only a few studies on immigrants (Contini, 2013; Schneeweis, 2015). As other studies we can confirm an increasing marginal effect of immigrant peers on educational outcomes (Tonello, 2016e.g.), here on dropout probabilities. This is important with regard to policy making and when considering how to best distribute students from different backgrounds across educational settings. In this context, we go beyond existing studies showing that it is crucial to distinguish first- and second-generation immigrants, while considering them jointly, as the shares thereof relate to different dropout-scenarios for natives and immigrants. An important conclusion from our analysis is that higher shares of second-generation immigrants are more disadvantageous to educational outcomes of natives than first-generation

immigrants. Our results are very consistent in this respect and even for earlier educational experiences, namely those on primary education, show the negative relationship between second-generation immigrant shares and dropout risks.

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