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Voor Marit en Jolijn

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Voorwoord

Voor Marit en Jolijn

In 2010 leidde een studie naar etnische diversiteit en schoolprestaties zowel op de nationale tv als in het Nederlandse parlement tot debatten. Het onderscheid dat werd gemaakt tussen de termen "percentage leerlingen met een migratieachtergrond" en "etnische diversiteit" was een vernieuwing binnen het onderwijsonderzoek. Vanuit mijn eigen ervaring als leraar basisonderwijs (2002-2012) kon ik me vinden in het onderscheid dat Dronkers maakte: zijn verdere verfijning van het meten van de etnische schoolcompositie was een manier van modelleren die dichter bij mijn ervaring als leerkracht kwam.

Het debat rond etnische diversiteit en onderwijsprestaties werd helaas te weinig gevoerd met passende onderbouwingen. Na een discussie met Jaap Dronkers over zijn studie, daagde hij mij uit om met zijn begeleiding een proefschrift te schrijven over dit thema, waarbij ik de argumenten uit de discussie en de argumenten die ik zelf inbracht, zou onderzoeken. De begeleider van mijn masterthesis Herman van de Werfhorst, was bereid om als promotor zijn waardevolle begeleiding van mijn academische ontwikkeling voort te zetten. De promotiebeurs voor leraren van de Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO) maakte het mogelijk om, naast mijn baan als docent onderwijskunde binnen het hbo, in 2012 te starten met het promotietraject.

Het project gaf me de mogelijkheid om mijn bevindingen te delen met een grote groep onderzoekers. Hierbij hebben mijn promotoren steeds een centrale rol ingenomen. Graag maak ik van de gelegenheid gebruik om enkele personen die mij hebben begeleid persoonlijk te bedanken. Herman, bedankt dat je me een plek in je programmagroep aan de Universiteit van Amsterdam gaf en altijd bereid was om concepten te corrigeren, te bespreken en mij te ondersteunen met nieuwe ideeën en kritische vragen. Jaap Dronkers inspireerde mij met zijn eindeloze enthousiasme voor onderzoek, introduceerde mij op diverse plekken en nam de tijd voor persoonlijke vorming. Helaas overleed Jaap onverwachts tijdens de afrondende fase van het proefschrift. Thijs Bol, bedankt dat je toen direct bereid was om het copromotorschap op je te nemen. Je begeleidende opmerkingen zijn in de afrondende fase erg nuttig geweest.

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Gert-Jan Veerman

Ede, voorjaar 2017

Contents

Chapter 1

Introduction

1.1 Introduction

Both first- and second-generation migrant-origin students perform worse in school performance tests than native-origin students in most Western countries (Alba, Sloan and Sperling 2011; Cattaneo and Wolter 2012). This ethnic inequality can potentially be explained by the characteristics of the individual students, schools, and origin and destination countries. Changing the schools' ethnic composition is seen by policymakers as one opportunity to provide migrant-origin students with more equal educational opportunities (New and Merry 2014).

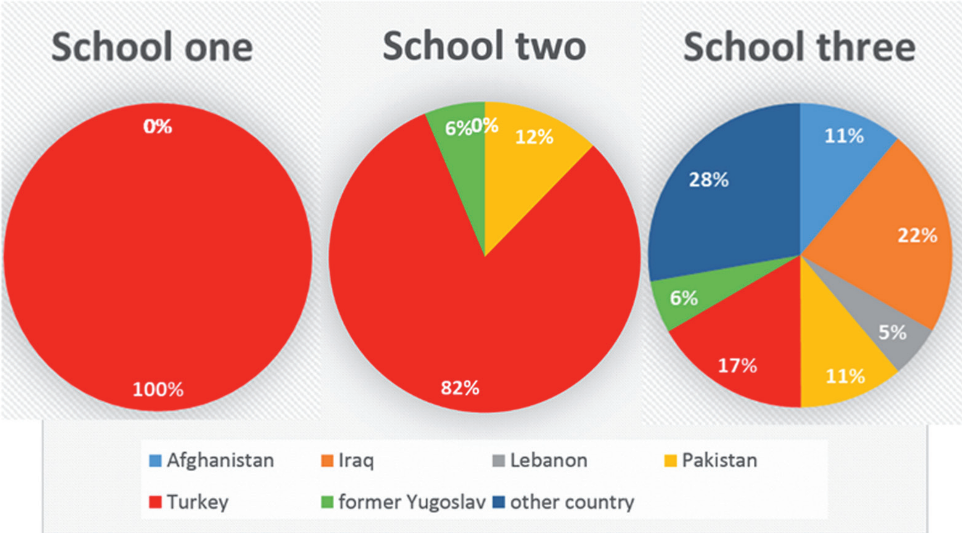
Opportunities to change the ethnic composition of schools started after the U.S. Supreme Court's declaration in *Brown v. Board of Education* (1954), which was underpinned by an outcome from social science (Armor 1972). The relationship between the share of migrant-origin students and school performance has been studied by a large number of social scientists in both the United States and Europe in the decades since the court decision (Coleman, 1966; Peetsma et al. 2006; Schofield 1991; Van Ewijk and Sleegers 2010b). A recent meta-analysis indicates that the relationship between the share of migrant-origin students and school performance differs across countries and across different origin groups (Van Ewijk and Sleegers 2010b).

When researchers focus only on the share of migrant-origin students in studies on school performance, they treat all migrant-origin students from different origin countries as a homogeneous group at the school level. However, students from different origin countries differ in their school performance and in their possible educational needs (Dronkers and Van der Velden 2013). A few studies have recently started to *differentiate* between the *share of migrant-origin students* and *ethnic diversity* (Dronkers 2010; Maestri 2011a; Van Houtte and Stevens 2009) to take the variability of origin countries within schools into account. Whereas the share of migrant-origin students refers to the percentage of migrant-origin students in a school (independent of the ethnic origins of the students), ethnic diversity takes the number and relative size of different ethnic groups into account and thereby measures the relative number of possible interethnic contacts in a school.

The conceptual difference between ethnic diversity and the share of migrant-origin students becomes obvious in Figure 1.1, which shows three schools from Denmark in PISA 2009 with 100 percent migrant-origin students and extreme differences in ethnic diversity[1]. Schools one through three have an ethnic diversity of 0.00, 0.32 and 0.81, respectively. Whereas students in the first school have no

[1] Most European data contain, for example, for pupils with parents of Turkish-origin only information about their origin country. However, these parents could have, for example, a Turkish, a Kurdish, or an Armenian ethnicity (Hutchinson and Smith 1996). Although the indicator refers to country of origin diversity instead of ethnic diversity in the data, I will use the concept ethnic diversity and ethnic composition because these terms are more common in the research field.

Figure 1.1: The percentages of origin groups at three schools in Denmark with 100 percent students of migrant descent in the Programme for International Student Assessment (PISA) 2009



School one, N = 23; school two, N = 16; school three, N = 18.

opportunities for interethnic contact, the third school allows for a relatively high number of possible interethnic contacts (Figure 1.1). Whereas students within the third school will have more opportunities to be enriched by the different ideas from the different ethnic groups and could also experience interethnic tensions, students in the first school will have no opportunities at school to participate in such interethnic experiences. Consequently, the share of origin-migrant students and ethnic diversity refer to distinctive mechanisms that could explain educational outcomes.

Different mechanisms are mentioned that could explain the relationships between the share of migrant-origin students and school performance and between ethnic diversity and school performance at the school level (Dronkers and Van der Velden 2013; Maestri 2011a). For instance, it is argued that teachers in schools with a high proportion of migrant-origin students could specialize to better support their educational needs (Peetsma et al. 2006). However, higher ethnic diversity could lead to problems in adapting the instructions to the different needs of the students (Dronkers and Van der Velden 2013). Besides *teaching mechanisms,* Sykes and Kuyper (2013) cluster the mechanisms into *organizational* and *peer-group mechanisms*. It remains unclear which of these explanatory mechanisms actually occur in practice and how relatively important these different explanatory mechanisms are, because the mechanisms have barely been empirically studied.

Because the differentiation between ethnic diversity and the share of migrant-origin students in a research model is relatively new, the relationship between ethnic diversity and school performance is only known for a selected group of Western countries. To my knowledge, only a working paper in the Netherlands (Maestri 2011a) and the inaugural lecture of Dronkers (2010) on 15 Western countries distinguish between the share of migrant-origin students and ethnic diversity while studying the relationship between ethnic composition and school performance. Therefore, the possibility of generalizing the findings of the relationship between ethnic diversity and school performance to different countries has been disputed (Herweijer 2011; Verbeek et al. 2015). The different findings in different countries could be driven by institutional differences across countries. For instance, countries differ in their integration policies, which are indicators of their 'warmth of welcome' (Heath and Cheung 2007). Institutional country characteristics could influence the interactions of students in the classroom and consequently explain part of the differences in the relationship between ethnic composition and student behaviour in schools.

This study focuses on the crucial distinction between ethnic diversity and the share of migrant-origin students. We advance on the literature in three important ways. First, earlier studies that have distinguished between the share of migrant-origin students and ethnic diversity only focus on school performance or social participation outside school – and not on the behaviour of the students at school. Therefore, this thesis focuses not only on school performance but also on student disruptive behaviour as an outcome that is associated to schools' levels of ethnic diversity. It also uses recent datasets that contain more Western destination countries than earlier studies.

Second, it is unclear which theoretically proposed mechanisms empirically explain the relationship between schools' ethnic composition and school performance. Hence, this thesis empirically disentangles a number of mechanisms that could explain the relationship between ethnic composition and school performance, including, in particular, teaching, organizational, and peer-group mechanisms.

Third, the differences in the relationship between ethnic diversity and school performance across countries could be driven by these countries' institutional differences. For instance, destination countries differ in their policies to enhance the integration of migrants and their descendants (Heath and Cheung 2007). Consequently, this thesis examines whether integration policies could explain the difference in the association between ethnic diversity and disruption across countries.

1.2 Research questions

In developing the research questions, this thesis follows recent scholarship on differentiating between the associations between ethnic diversity and school performance and between the share of migrant-origin students and school performance.

The relationship between ethnic composition and school performance differs between the destination countries of the migrant-origin students and age stages.

Moreover, studies that differentiate between ethnic diversity and the proportion of migrant-origin students separate between migrant-origin and native-origin students in their analyses. Although the relationship between ethnic diversity and school performance could be comparable across migrant-origin groups, these relationships could also differ within a migrant-origin group, because earlier research on ethnic composition and school performance shows differences between different ethnic origin groups.

Although earlier studies that used both the share of migrant-origin students and ethnic diversity focus on both school performance and social participation outside school (Dronkers 2010; Van Houtte and Stevens 2009; Maestri 2011a), the literature lacks information about the relationship between perceived student disruptive behaviour and ethnic diversity net of the share of migrant-origin students. The literature gives the idea that a higher relative number of possible interethnic contacts could lead to more ethnic tensions (Esser 2004), because students in schools with higher ethnic diversity need to bridge relatively more interethnic differences. Thus, students in a school with higher ethnic diversity could perceive more disruptive behaviour of the students in the classroom. I thus propose the first research question.

RQ1: What are the relationships between the sub-dimensions of ethnic composition (share of migrant-origin students and ethnic diversity) and school performance and disruptive behaviour in schools in Western societies?

Earlier researchers suggest mechanisms that could explain the relationship between the ethnic composition and school performance. However, most never empirically showed the extent to which these mechanisms actually occur in practice.

The differentiation between ethnic diversity and the share of migrant-origin students provides an opportunity to partly disentangle the different explanations that are given within these mechanisms. For instance, the peer-group mechanisms contain mechanisms that refer to both sharing resources between peers and possible ethnic tensions between peers. Negative relationships between the share of migrant-origin students are explained by a lower opportunity of contacts with native-origin students who speak the destination language as their mother tongue (Driessen 2002). Moreover, schools with a high ethnic diversity of migrants have a greater opportunity for contacts with different ethnic groups. This could lead to more possible tension from the higher number of ethnic barriers that must be crossed (Esser 2004) due to the greater potential for interethnic contacts. Because ethnic tensions lead to lower school performances (Hoxby 2000), a negative relationship between ethnic diversity and school performance could refer to a peer-group mechanism of ethnic tensions. This brings us to the second research question.

RQ2: To what extent can teaching, organizational, and peer-group mechanisms explain the relationships between the sub-dimensions of ethnic composition (share of native-origin students and ethnic diversity) and school performance?

Finally, differences in the relationship between ethnic diversity and school performance across countries could be explained by institutional differences in how different ethnic groups interact in different countries. 'Equal status' and 'authority support' are conditions for positive contact between different ethnic groups (Allport 1954). Countries use integration policies to influence equal opportunities in access to education and labour between different ethnic groups. For instance, more inclusive integration policies will increase the likelihood of equal status for new immigrant groups compared with older immigrant groups that already have access to labour and education and native-origin students. More inclusive integration policies could reduce tensions between different ethnic groups by reducing ethnic barriers (Esser 2004). Therefore, more inclusive integration policies partly explain the difference in the relationship between ethnic diversity and student disruptive behaviour across countries by reducing tensions (Esser 2004) between the different ethnic groups. I thus propose the third research question.

RQ3: To what extent does the relationship between ethnic diversity (net of the share of migrant-origin students) and student disruptive behaviour differ across countries due to integration policies?

1.3 Conceptualization of ethnic background

The conceptualization of ethnic background and migration background is a contested one. Identification with an ethnic group or origin country differs between individuals and between first- and second-generation migrants (Essed and Trienekens 2008). The classification of persons as being of migrant origin may lead to specific policies for those classified as migrant-origin students, as well as to the stigmatization of persons classified as being of migrant origin (Duyvendak and Scholten 2012; Van Reekum, Duyvendak and Bertossi 2012). Moreover, classification into natives, Western migrants, and non-Western migrants relates to ideas of Western superiority (Essed and Trienekens 2008).

Whereas American studies conceptualize the ethnic background of students with the student's identification to an ethnic or racial group, in European studies frequently do often not strictly refer to ethnicity but, rather, to the origin country or only to the migration origin of the students. Students who are classified as migrant-origin students include second-generation students who were born in the destination country but have at least one parent who was born outside the country where they live.

Although ethnic background and migrant origin are contested concepts, it is relevant to study the extent of educational differences between students from different ethnic or migrant-origin groups and students of native-origin. Classifying students into ethnic or country-origin groups is necessary to quantitatively compare the students but is a simplification of their possible actual experience. Classifications of gender and social class in social science demonstrates that other classifications often face comparable problems of simplification as classifications of ethnicity or migrant origin. Although classification into ethnic groups could lead to stigmatization, classification into ethnic groups could provide relevant information on the structural inequalities of migrant-origin groups in different countries and supply teachers with information about students who are classified into a specific ethnic group that could give these students greater equal opportunity (Gay 2002).

In this thesis, I define a migrant-origin student as a student with at least one parent who was born outside the destination country (Levels and Dronkers 2008). This definition is comparable to the official definition of Statistics Netherlands which is based on the country of birth of child and/or parent(s). Migrant-origin students in this thesis thus refer to first- and second-generation migrant-origin students. The advantage of this classification is that the origin country refers to an objective characteristic; however, the identification of students with their origin background is contested, especially for second-generation students.

1.4 Relationships between ethnic diversity, the share of migrant-origin students, and school performance or disruptive behaviour

Although ethnic diversity and the share of migrant-origin students are conceptually and methodological different, it seems that both concepts are strongly connected to different specializations in the social sciences. Whereas studies on geographical units especially use ethnic diversity as an indicator of the ethnic composition of units (Gijsberts, Van der Meer and Dagevos 2012; Lancee and Dronkers 2011; Tolsma, Van der Meer and Gesthuizen 2009), educational studies often use the share of migrant-origin students as an indicator of the ethnic composition of schools (Cebolla-Boado and Mediana 2010; Hanushek, Kain and Rivkin 2002; Peetsma et al. 2006; Van Ewijk and Sleegers 2010b).

The two studies on school performance that use both ethnic diversity and the share of migrant-origin students as indicators of ethnic composition show opposite findings. Dronkers (2010) finds a significant relationship between ethnic diversity and reading performance, using cross-national educational information on 15-year-old students of migrant descent in 2006. However, Maestri (2011a) finds positive associations between ethnic diversity and the school performance of students of migrant descent, using educational information on primary school students in the Netherlands. It could therefore be argued that the relationship between ethnic diversity and school performance is country or age dependent (Peetsma et al. 2006). The findings of Herweijer (2011) seem to confirm that the significant relationship is country dependent, because Herweijer also finds no significant relationship between ethnic diversity and school performance in the Netherlands for secondary school students. Nevertheless, the author's research model only focuses on ethnic diversity and does not differentiate between ethnic diversity and the share of migrant-origin students. Consequently, the indicator of ethnic diversity that Herweijer uses also partly measures the share of migrant-origin students due to the high correlation between the concepts.

One of the problems of the study of Dronkers (2010) is that it focuses on a selected number of Western countries that does not include the Netherlands. Consequently, it is unclear whether the relationship between ethnic diversity and school performance is country context dependent. Furthermore, both Maestri (2011a) and Dronkers (2010) analyse students at different age stages. Earlier meta-studies show an increase of peer group effects as pupils get older (Van Ewijk and Sleegers 2010a). Consequently, the different age stages of the students in the different studies could also explain the differences in results.

Although the analytical strategies of both Maestri (2011a) and Dronkers (2010) distinguish between migrant- and native-origin students, the association between ethnic diversity and school performance could also differ between ethnic groups. For instance, Van Ewijk and Sleegers (2010b) find differences in the relationship between ethnic school composition and school performance between African Americans and other students of immigrant descent in the United States. In Europe, the largest migrant group is from Turkey. The relationship between ethnic school composition and school performance could differ between Turkish-origin students and other migrant-origin students.

Migrant-origin students of Turkish-descent are known for their strong ties within their ethnic group network (Fennema and Tillie 1999; Van der Veen and Meijnen 2001; Van Heelsum 2005). Consequently, Turkish-descent students could also share educational resources with co-ethnic peers. For instance, Turkish-descent students can help each other translate topics of the lessons to their shared foreknowledge of the topic. Moreover, a larger group of Turkish-descent students in a classroom could increase their feelings of belonging (Osterman 2000). Schools with higher ethnic diversity have a combination of more and relatively larger ethnic groups than schools with less ethnic diversity. Consequently, the relationship between ethnic diversity and school performance could differ between Turkish-descent students and other students of migrant descent, because Turkish-descent students could benefit from stronger ties within the co-ethnic group more strongly than from the relatively large size of the co-ethnic group in schools with higher ethnic diversity.

Higher ethnic diversity could also lead to a smaller percentage of co-ethnics for Turkish-descent students, because ethnic diversity refers to both the number and size of the ethnic groups. Because, Turkish-descent students belong to the largest migrant group in Europe, a higher number of ethnic origin groups could also lead to a reduction of the percentage of co-ethnics for them. This effect refers to another sub-dimension of ethnic composition: the share of co-ethnics (Geven, Kalmijn and Van Tubergen 2016). Finally, whether the resources that are shared between Turkish-descent students are valued within the school system could be doubtful.

Earlier research that distinguishes between ethnic diversity and ethnic share focuses on school performance, friendships, and attitudes but not on disruptive behaviour in school. Cross-national research shows a positive association between the share of migrant-origin students and disruptive student behaviour (Arum and Velez 2012). Whereas the share of migrant-origin students refers to the opportunity for contacts with native-origin students, ethnic diversity refers to the relative possible number of interethnic contacts. Consequently, students in schools with higher diversity need to bridge relatively more interethnic differences. Bridging these difference could lead to more ethnic tensions (Esser 2004) or lesser feelings of belonging (Osterman 2000). In particular, these ethnic tensions and lesser feelings of belonging could lead to more classroom disruption. Consequently, differentiation between the share of migrant-origin students and ethnic diversity could clarify whether these potential interethnic tensions can explain the growth of disruptive behaviour in schools with a higher share of migrant-origin students or higher ethnic diversity.

1.5 Explanatory mechanisms

Although different mechanisms are distinguished to explain the relationship between ethnic composition and school performance, they are barely empirically studied. Sykes and Kuyper (2013) mention three clusters of interrelated mechanisms that could explain the relationship between ethnic composition and school performance: (1) *teaching mechanisms*, (2) *organizational mechanisms,* and (3) *peer-group mechanisms*.

The distinction between the share of native-origin students and ethnic diversity provides an opportunity to partly disentangle the mechanisms, because it provides an opportunity to differentiate, in teaching and peer-group mechanisms, between mechanisms that emphasize the opportunity for contact with other ethnic groups and those that emphasize the opportunity for contacts with students of native-origin.

Teaching mechanisms

From a *teaching mechanism perspective,* positive relationships between the *share of migrant-origin students* and their school performance is explained by the specialization of teachers (Peetsma et al. 2006) to adapt their teaching to the needs of migrant-descent students. From a teaching perspective, negative relationships are explained by teachers lowering standards (Rosenthal and Jacobsen 1968) in schools with a higher share of migrant-descent students.

Teaching quality could explain the relationship between the share of native-origin students and school performance. Migrant-origin parents could select schools with worse teaching quality (Schofield 1991) because they are less informed about the educational system. It is argued that better-informed parents choose schools with better-qualified teachers (Driessen 2002). Besides, higher-qualified teachers segregate into better-situated schools (Lupton 2005). Whereas the share of migrant-origin students only takes into account whether the students are of migrant origin or not, *ethnic diversity* also takes into account the origin country of the students and their parents. Consequently, teachers in a school with higher diversity given the share of migrant-origin students need to adapt their teaching to more different needs than would be expected given the share of migrant-origin students. The higher ethnic diversity of students' needs in schools with higher ethnic diversity could explain the negative association between ethnic diversity and the school performance of migrant-origin students (Dronkers and Van der Velden 2013), because teachers are most likely focusing their instruction on the largest ethnic group in the classroom.

School organization mechanisms

Negative relationships between the *share of migrant-origin students* and school performance are explained by a mechanism where better-informed parents choose schools that *organize* more resources that could benefit student learning (Driessen 2002). Consequently, information about the organization of schools that is available in the parental network is a form of social capital (Coleman 1988) that could be available in the parents' network. In particular, when the parents of migrant-origin students are less informed about the organizational quality of schools, they could select into schools with fewer resources. In particular, schools where most students speak another language seem to suffer from a lack of appropriate teaching resources (Lupton 2005). Therefore, in the literature, organizational mechanisms are especially linked to the *share of migrant-origin students*.

Peer-group mechanisms

From a *peer-group perspective,* the negative relationship between the *share of migrant-origin students* and school performance for migrant-origin students is explained by the opportunity of contacts with native-origin students. Students' language development in schools with a higher share of migrant-origin students could be inhibited by the lesser opportunities for contact with students speaking the national language as their mother tongue (Driessen 2002). However, higher opportunities of contacts with migrant-origin students could also facilitate the school performances of students, because majority of international migrants tend to come not from the poorest families and poorest communities in their origin country (De Haas, 2007). Van de Werfhorst, Van Elsas, and Heath (2014) show that positively-selectively migrant communities have higher levels of advantage in school performance relative to the native-origin population. Therefore, a higher opportunity of contacts with positively-selectively migrant-origin students could also explain positive relationships between the share of migrant-origin students and school performance. *Ethnic diversity* refers to another part of peer-group mechanisms. Higher ethnic diversity could lead to more ethnic tensions, since students in schools with higher ethnic diversity have to bridge more potential interethnic barriers (Esser 2004). Ethnic tensions could lead to disruptive behaviour during lessons and, consequently, to loss of effective teaching time. Disruptive behaviour relates negatively to reading performance in most Organisation for Economic Co-operation and Development (OECD) countries (Ning et al. 2015). Moreover, Hoxby (2000) shows that ethnic tensions relate to lower school performance. Therefore, the negative relationship between ethnic diversity and school performance could be partly explained by ethnic tensions or lesser feelings of belonging (Osterman 2000).

Although disruptive behaviour could explain the negative relationship between ethnic diversity and school performance, greater opportunity for interethnic contacts could also enrich the students, since they could have greater opportunities to receive information about different cultures (Lazear 1998). However, for a positive relationship between the greater opportunity the of receiving information of the different cultures and school performance, this information should be seen as relevant (Lazear 1998). Consequently, this enrichment could lead to positive relationships between ethnic diversity and school performance in contexts where peers, teachers, and the organization all value the information of the different cultures.

Interrelated mechanisms

It is important to emphasize that the teaching, organizational, and management mechanisms are strongly interrelated. Therefore, examples that are related to a specific mechanism could also partly relate to another mechanism. For instance, less information about the educational system from migrant-origin parents leads to – besides the possible choice of schools with fewer resources that benefit learning (*organizational mechanism)* – to a lower desire to invest in capital in the destination country (Esser 2004) and a more ambivalent view of schooling in the destination country of the parents and their children. Furthermore, the selection of specific parents who value better-organized schools also selects specific students with more resources to these schools. This selection combination of students with different resources and different views on schooling could lead to specific *peer-group mechanisms* (Crul and Doomernik 2003) in badly organized schools.

1.6 Integration policies and differences in the relationship between ethnic diversity and disruptive behaviour across countries

The influence of ethnic composition on school performance and the mechanisms that explain this relationship could differ across countries (Herweijer 2011; Verbeek, et al. 2015). Countries influence the educational opportunities of migrant-origin students and the relationships between different origin groups through multicultural and integration policies. Multicultural curricula as part of the multicultural policies refer, for instance, to the content of curricula and focus on constructing new equal relationships between groups of different origin countries. Integration policies focus on the extent of equality of access for migrant and migrant-origin students to the curriculum and, for instance, the job opportunities of recent migrant parents, migrant-origin parents, and native-origin parents.

Although a multicultural curriculum at the country level could be seen as an organizational mechanism that could lead to greater equal opportunity for migrant-origin students due to the content of the curriculum, it is argued (Gay 2002) that teaching mechanisms operationalized as quality of instruction are more important for educational opportunities than the organizational mechanisms of a multicultural curriculum at the country level, since instruction is an implementation of the curriculum in daily student life. However, the choice for a multicultural curriculum at the school level is an indication of how diversity is valued in a school or country. Recently, a positive relationship was shown at the school level between a multicultural curriculum and the school performance of at-risk students in the United States (Dee and Penner 2016).

Equal access to both the welfare state and the labour market (an inclusive integration policy) are vital for the success of multiculturalism (Kymlicka 2012). No direct relationship between integration policies and the school performance of migrant-origin students has been found (Bilgili, Huddleston and Joki 2015), but Van de Werfhorst, Van Elsas, and Heath (2014) show less ethnic inequality in the school performance test scores in countries with more inclusive integration policies. It is unclear whether this lesser degree of inequality can be explained by individual characteristics or by school characteristics.

Because associations between ethnic diversity and classroom disruption could be explained by ethnic tensions (Esser 2004), the ‘contact hypothesis’ (Allport 1954) especially provides ideas on how the relationship between ethnic diversity and students’ behaviour could differ across countries due to integration policies. The intensity of tensions between ethnic groups differs across different country contexts, because the conditions are structured and formed by institutional norms (Pettigrew 1998). The contact perspective (Allport, 1954) argues that (1) equal status, (2) common goals, (3) intergroup cooperation, and (4) authority support are four conditions for optimal contact between different ethnic groups.

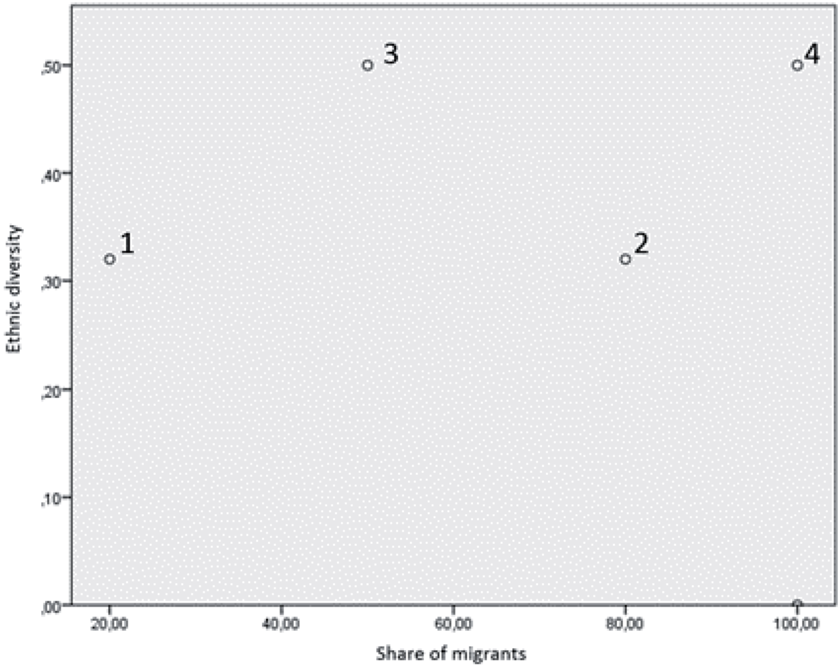
Countries influence equality between different ethnic groups and native-origin students and support it with their authority by using integration policies. Consequently, more inclusive *integration policies* optimize contact between different ethnic groups and therefore reduce tensions between them by supporting the equal status between different ethnic groups. These differences in the degree of tension between different countries due to integration policies could explain part of the difference in the relationships between ethnic diversity and student behaviour in countries with a more inclusive integration policy.

1.7 Measuring ethnic diversity and methodological issues

Although ethnic diversity is frequently measured with an inverted Herfindahl index, other research uses only the number of ethnic groups as an indicator of ethnic diversity (Driessen 2002). The Herfindahl index is calculated as follows: 1 - [(proportion of ethnic group 1)^2 + (proportion of ethnic group 2)^2 + . . . + (proportion of ethnic group n)^2]. Therefore the operationalization of diversity emphasizes yet another dimension of ethnic composition besides just the number of ethnic groups, since the number of different ethnic groups neglects their relative sizes. Therefore, a higher number of possible different ethnic groups does not necessarily lead to more interethnic contacts.

I note two conceptual considerations of ethnic diversity measured with an inverted Herfindahl index of ethnic compositions. First, ethnic diversity measured with the inverted Herfindahl index is colour blind (Dronkers 2010). Consequently, when I translate the example of neighbourhoods of Abascal and Baldassarri (2015) to the school context, a classroom with 80 percent native-origin students and 20 percent students of Turkish descent (Figure 1.2, point 1) will have the same ethnic diversity measurement of 0.32 as a classroom with 20 percent native-origin students and 80 percent Turkish-ancestry students (point 2). Therefore, ethnic diversity indicates the relative number of possible interethnic contacts, but not possible contacts between native- and migrant-origin students. Second, Posner (2004) shows that a comparable ethnic diversity index could refer to a completely different composition in terms of the numbers and sizes of the different ethnic groups. For instance, a classroom with native-origin and Turkish-descent student groups of equal size (point 3) and a classroom with two-thirds native-origin students, a one-sixth Turkish-descent students, and one-sixth Russian-descent students both have an ethnic diversity of 0.5. Figure 1.2 shows the different ethnic compositions mentioned in the examples.

Figure 1.2: Percentages of migrant-origin students and ethnic diversity in the hypothetical examples



The simultaneous use of both the percentage of migrant-origin students and ethnic diversity in one model could be an opportunity to distinguish schools of comparable ethnic diversity but a conceptually different ethnic composition in terms of the proportion of migrant-origin students. However, differences in the sizes and numbers of groups of schools with a comparable ethnic diversity could not be distinguished with the Herfindahl index. Thus, it is important to emphasize that higher ethnic diversity does not necessarily refer to more ethnic groups but, instead, to relatively more possible interethnic contacts.

A number of methodological issues arise when measuring the relationship between ethnic composition and school performance. It is argued that the use of both the share of migrant-origin students and ethnic diversity leads to problems of multicollinearity. Moreover, ethnic composition effects on school performance could be biased due to the selection of specific students into schools with a high share of migrant-origin students or high ethnic diversity. Finally, explanatory mechanisms could not be studied with a design that focuses on forward causal questions (Gelman and Imbens 2013).

Although it is argued that both ethnic diversity and the share of migrant-origin students should be considered in a single research model to obtain unbiased results (Abascal and Baldassarri 2015), others argue that ethnic diversity and the share of migrant-origin students correlate too strongly to allow for a joint investigation

(Herweijer 2011; Janmaat 2012; Sykes and Kuyper 2013) due to problems of multicollinearity. The main problem with multicollinearity is that it produces inefficient standard errors (York 2012). Moreover, it could lead to unstable estimates (Lin 2008), because small changes or differences in datasets could produce large changes in parameter estimates due to these large standard errors (O'Brien 2007). If the standard errors of research that differentiates between the share of migrant-origin students and ethnic diversity are strongly inflated, the conceptual difference between the concepts is theoretically relevant but the different results will be unstable and frequently non-significant.

Janmaat (2012) shows Pearson correlations between R = 0.89 and R = 0.98 between the share of migrant-origin students and ethnic diversity using 1999 International Association for the Evaluation of Educational Achievement (IEA) Civic Education Study data. Moreover, Herweijer (2010) shows a Pearson correlation of R = 0.91 between the share of migrant-origin students and ethnic diversity using Dutch educational data. Although high correlations between variables are an indication of multicollinearity, both authors neglect to test whether multicollinearity arises when both variables are used in a regression. Consequently, it is important to first control whether multicollinearity could be a serious problem using a variance inflation factor (VIF) check. This check quantifies the degree to which the standard errors in models with both the share of migrant-origin students and ethnic diversity are influenced by linear relationships between ethnic diversity and the share of migrant-origin students (Kleinbaum et al. 2008).

Relationships between the ethnic composition of schools and school performance could be biased by the selection of specific students into schools with a certain type of ethnic composition. For instance, schools with a lower share of migrant-origin students could attract better-educated, better-informed, or more concerned parents. Consequently, the relationship between the share of migrant-origin students and school performance could refer to a selection of students and not to a causal relationship between ethnic composition and school performance, since I and earlier researchers use cross-sectional data. Although the use of experimental designs has advantages when dealing with endogeneity, these studies will have problems with external validity.

It is complicated to combine causal relationships and explanatory mechanisms in one empirical study, because the explanatory mechanisms could have not just a simple single causal path but also other possible paths (Gelman 2011). Whereas experimental designs frequently refer to a specific context, cross-sectional datasets frequently contain comparable data from different countries. Because the research questions focus on a number of both explanatory mechanisms and country differences, specific research designs and datasets are needed.

1.8 Research approach

Given the high correlation between ethnic diversity and the share of migrant-origin students and the theoretical importance of distinguishing between both concepts, I employ an empirical model that can distinguish between the share of migrant-origin students and ethnic diversity without inefficient standard errors due to multicollinearity. This empirical model uses information on the distance of ethnic diversity that could be expected given the share of migrant-origin students in the school. This residualized ethnic diversity will no longer measure absolute ethnic diversity but, rather, ethnic diversity given the share of migrant-origin students. Consequently, a positive ethnic diversity indicator will refer to relatively more possible interethnic contacts than could be expected given the share of migrant-origin students in the school. Moreover, the relationship between the share of migrant-origin students will be not measured given ethnic diversity. Consequently, the parameter estimates of the share of migrant-origin students will be mostly comparable to those of studies that focus only on the share of migrant-origin students.

The problem with testing relationships between ethnic composition variables and dependent variables is that these relationships can easily capture the characteristics of individual students who belong to the ethnic groups that form the ethnic composition (Abascal and Baldassarri 2015). For instance, when migrant-origin students in a country underperform students of native descent, the relationship between the share of migrant-origin students and school performance can be explained by the individual characteristics of the students who form the ethnic composition but cannot be explained by the ethnic school composition itself. The influence of these individual characteristics could, in single destination countries, be easily controlled for by using controls for the students' individual origin countries. However, when cross-country studies control for the individual origin countries using origin country variables, the results could be biased because migrant groups could be differently selected and integrated in destination countries (Van Tubergen 2006). Consequently, origin and destination country fixed effects or cross-classified multi-level models with students nested in schools and origin groups nested in destination countries to model the variance of the school performance of migrant groups in different destination countries that existed ex ante (Levels, Dronkers and Kraaykamp 2008) are needed.

I investigate the question about the relationship between ethnic diversity and school performance in a number of different countries, using the 2008 Dutch Cohort Research on Educational Careers (*Cohort Onderzoek Onderwijsloopbanen,* or COOL) and PISA 2009 data. Both datasets collected information about the country of origin of students and their parents and a high number of other social and economic background information combined with standardized school performance test results. Therefore, these datasets allow the calculation of both the share of migrant-descent students and ethnic diversity. The COOL data contain information on the school performance of Dutch primary school students in second, fifth, and eighth grades. The COOL school performance tests are nationally standardized tests developed by the Dutch national testing agency (CITO). The reading performance test refers to the students' understanding of the content of written texts. The math performance test refers to the number of math curriculum units, such as knowledge of the clock and mental calculations, that form a scale of math performance (Driessen et al. 2009). Research using older Dutch school performance data finds a positive association between ethnic diversity and school performance for students of migrant descent. Consequently, I could study the relationship between ethnic diversity and school performance for students in primary education using a recent dataset and an approach that is not influenced by multicollinearity.

The PISA 2009 dataset contains standardized test scores in both reading and math from students' school performance tests developed by PISA. Reading performance refers to the extent to which 15-year-old students can use their reading skills to understand and interpret various kinds of written material. Math performance refers to the extent to which 15-year-old students can use their mathematical knowledge and skills to solve various kinds of numerical and spatial challenges and problems (OECD, 2012). Moreover, the PISA 2009 dataset contains the opinions of almost all students on the disruptive behaviour of their classmates during reading lesson, using a number of questions about the perceived disruption. Therefore, PISA 2009 allows for calculation of a disruption index for schools in OECD countries and the study of the association between ethnic diversity and classroom disruption. PISA 2009 contains a relatively large group of Turkish-origin students, because Turkish-origin migrants form the largest group in Europe. Therefore, PISA 2009 provides an opportunity to study the relationship between ethnic composition and school performance for Turkish-origin students.

PISA 2009 provides an opportunity to control for teaching and organizational mechanisms, because it also collected information on school principals. Moreover, the classroom disruption index can be used as a peer-group mechanism indicator of interethnic tensions or lesser feelings of belonging in schools with greater opportunities for interethnic contact.

Finally, the relatively high number of countries collected for the PISA dataset allows one to control for institutional differences in the relationship between ethnic composition and school performance. Indicators for multicultural curricula have only recently become available at the country level (Migrant Integration Policy Index, or MIPEX, 2015). It could be doubted whether cross-country analysis is able to control for the advantage of higher ethnic diversity for school performance, because country school performance tests from a database that tries to compare countries value cultural diversity at mostly comparable levels. Moreover, the experience of student equality is also influenced by policy areas other than multicultural education – such as access to citizenship and to the labour market – and is vital to the success of multicultural policies.

I use MIPEX to study the influence of integration policies on the relationship between ethnic diversity and classroom disruption across countries. The MIPEX data indicate the extent of inclusiveness regarding six integration policy areas: labour market access, family reunions, long-term residence, political participation, access to citizenship, and anti-discrimination laws (Niessen, Huddleston and Citron 2007). Consequently, MIPEX is an indication of country policies that influence equality between different migrant groups, migrant-origin groups, and native-origin students and support it with their authority. Although, the combined dataset of MIPEX and PISA contains 16 destination countries, the possibility of comparing countries using a multi-level approach has been widely discussed recently. A number of these studies indicate that a Bayesian estimation approach is preferable to a maximum likelihood estimation approach (Bryan and Jenkins 2016; Stegmueller 2013). Therefore, I estimate Bayesian statistics in the analysis that investigates institutional differences in the relationship between ethnic diversity and classroom disruption.

1.9 Thesis outline

This thesis consists of six chapters. Because I especially focus on the differentiation between ethnic diversity and the share of migrant-origin students, each chapter studies the first research question in a different context. Chapters 2, 3, and 5 focus on the relationship between a school's ethnic composition and school performance and Chapter 4 focuses on the relationship between a school's ethnic composition and perceived classroom disruption.

Chapter 2 focuses on the relationship between ethnic school composition and both math and reading comprehension in the Netherlands for both native- and migrant-descent pupils in primary education, using Dutch COOL data covering different age stages. I control for possible multicollinearity and show how I could differentiate between ethnic diversity and migrant-origin students' share in a research model.

Chapter 3 studies the relationship between ethnic school composition and math performance for Turkish-descent students in seven different countries, using cross-national PISA data. Moreover, I differentiate between 19 European educational systems, combining cross-national with Swiss national PISA data.

Chapter 4 studies the relationship between ethnic school composition and classroom disruption, using cross-national PISA data for 20 countries for schools that contain both migrant- and native-origin students. In addition, this chapter studies the third research question, focusing on the difference in the relationship between ethnic diversity and classroom disruption across countries, combining cross-national PISA data from 16 Western countries with MIPEX data.

Chapter 5 studies the relationship between ethnic school composition and reading performance for migrant-descent students in 18 European countries, also using cross-national PISA data (research question one). In addition, this chapter focuses on the explanatory mechanisms (research question two), using information from students' and school principals' questionnaires in PISA. Table 1.1 summarizes how the chapters relate to the different research questions.

Finally, Chapter 6 summarizes the findings and provides policy implications and ideas for future research.

Table 1.1: The three research questions and the four chapters

	Chapter 2	**Chapter 3**	**Chapter 4**	**Chapter 5**
RQ1 **What**	Math and reading comprehension	Math performance	Disruptive behaviour	Reading performance
Who	Migrant- and native-descent primary education students in different age stages	Turkish-descent students in secondary education	Migrant- and native-descent students in secondary education	Migrant- and native-descent students in secondary education
Where	Netherlands	7 European countries	20 Western countries	18 European countries
RQ2				Migrant-descent students in secondary education
RQ3			Migrant- and native-descent students in secondary education; 16 Western countries	

Chapter 2

Ethnic composition of the class and educational performance in primary education in the Netherlands

Abstract

This chapter examines the effect of the ethnic composition in the school class on school performance in primary education, using COOL 2008 data for the Netherlands. We make an important distinction between the proportion of migrant-origin children and the diversity with regard to the different ethnic groups in a school class. Due to the strong correlation between these 2 variables, we employ a residualized score of diversity on the proportion of migrant-origin children. The diversity indicator, which indicates the level of diversity given a particular share of migrant-origin children, is negatively related to reading comprehension in Grade 8. For other grade years, we find little support for negative effects of diversity net of the share of migrant-origin children in a class.

2.1 Introduction

The relationship between the ethnic composition of schools and pupils' achievement is of growing interest to European researchers (Agirdag, Van Houtte and Van Avermeat 2012). Recently, the studies of Dronkers and Van der Velden (2013) and Maestri (2011b) made the interesting distinction between the ethnic share and ethnic diversity in a school or grade. The ethnic share refers to the proportion of migrant-origin children in a class (independent of ethnic group), whereas ethnic diversity refers to the composition in the class in terms of the number and size of different ethnic groups. This distinction is conceptually relevant, but the current literature is often blurred. Studies on the influence of "diversity" have in fact focused mostly on the proportion of migrant-origin children, rather than on the diversity within a class as such.

A few earlier studies focused on the distinction between the share of migrant-origin children and the diversity among them. Maestri's research (2011b) found that ethnic diversity increases language and math test scores of pupils with an immigrant background in primary education in the Netherlands. Nevertheless, Dronkers and Van der Velden (2013) found, with data from a selection of OECD countries of secondary school pupils, that a greater ethnic diversity of schools has a significant negative effect on the learning performance of migrant-origin children.[1] Meastri (2011b) explained in her study how differences in research designs probably influence the results.

Despite the growing awareness of the conceptual distinction between the share of migrant-origin children and the diversity in terms of the different groups, it seems that researchers interested in diversity have also often left out the share of migrant-origin children from their empirical models (Demanet, Agirdag and Van Houtte 2011; Herweijer, 2011). Related literature on the impact of ethnic diversity in geographical units on social cohesion has completely ignored the share of migrant-origin persons as a variable of interest (Gijsberts, Van der Meer and Dagevos 2012; Lancee and Dronkers 2011; Tolsma, Van der Meer and Gesthuizen 2009). This is unfortunate, as the conceptual distinction between proportions and diversity warrants closer inspection of their isolated effects on individual outcomes such as student learning. An important reason why researchers have often examined only one of the two concepts is presumably that these are strongly correlated, leading to problems of multicollinearity.

Therefore, we are interested in the partial effects of ethnic diversity and the proportion of migrant-origin pupils on school performance in mathematics and reading comprehension. We study this using rich survey data gathered among

[1] Van Houtte and Stevens (2009) also focused on the distinction between ethnic share and ethnic diversity; however, they measured the effect on the sense of belonging in school.

pupils in different grades in primary education in the Netherlands. We aim to contribute to the literature in three ways. First, we will explicitly demonstrate the methodological problem of including both the ethnic share and ethnic diversity in one model, and offer a solution to deal with this problem. This is necessary, because ethnic diversity and ethnic share are strongly correlated. Second, we measure ethnic diversity at the school class level instead of the school or grade level. We prefer class level, because most theories about the influence of ethnic diversity on school performances refer to the class level. Finally, we distinguish both the proportion of migrant-origin children and ethnic diversity in our model, using two distinct conceptualizations of diversity (Herfindahl's diversity index and the number of ethnic groups in the class). These two variables isolate different processes concerning diversity, and should be studied likewise.

2.2 The Dutch situation

The Dutch case is very interesting for the research question for several reasons. First, in the Netherlands there is a rich dataset (COOL) of 38,060 pupils from three different grade levels in primary education. Therefore, the group sizes of the different ethnic groups are large enough to distinguish 11 different ethnic groups at three different grades in primary school. Second, the database contains 550 schools with a wide range of ethnic compositions, containing both schools with a high proportion of migrant-origin children and a low proportion of migrant-origin children varying with percentages between 0 and 100% and schools in both rural and urban settings. Third, the percentage of foreign-born citizens in the Netherlands (11%) is comparable with the percentages of Norway (11%) and The United Kingdom (11%) and just below the percentage of France (12%) and Germany (13%) (OECD, 2011). Therefore, analyses of the Dutch case give indications of the effects of the ethnic composition that could occur in other European countries. Nevertheless, we should take into account the specific Dutch educational policy and the migration history.

Dutch educational policy

Earlier (comparative) studies characterized Dutch education policy by three essential elements (Dronkers 2004; Ladd and Fiske 2009). First, families have freedom of school choice, which makes it possible to avoid schools with high shares of migrant-origin pupils without the need to move house (Van Houtte and Stevens, 2009). This may explain the high level of ethnic segregation in Dutch primary schools, as has been documented by Ladd, Fiske and Ruijs (2010) and Karsten (2010). Second, by constitution parents have the right to establish their own schools under equal funding rights as public schools (and equal forms of government control concerning school quality). Originating from the "school struggle" in the early 20th century, the constitutional right enabled schools of religious denominations to establish schools under state funding. Third, the funding of schools from the central government is based on weighted pupil funding. Dutch schools with large concentrations of disadvantaged pupils receive more resources than schools with pupils of middle-class backgrounds. The funds per pupil depend on parents' education (and until 2006 also on ethnic background; Ladd and Fiske 2009).

Migration history

The Netherlands has a long migration history. Starting with the post-war period, the first big migration wave came from the former Dutch colony of the East Indies (Lucassen and Penninx 1997). The Turks and Moroccans started to migrate to the Netherlands during the 1960s after the influx of other "guest workers" from Italy, Greece, Portugal, and Spain. The migration from Suriname accelerated in the 1970s, when it became independent from the Netherlands. Later, also the influx of migrants from the Netherlands Antilles, in the Carribean, grew. More recent groups of refugees and those of "other" Western origin have been migrating to the Netherlands since the 1990s. These new, relatively small groups have become visible in the recent COOL dataset and have made the Dutch classrooms more ethnically diverse than previously.

2.3 Theory and hypotheses

Ethnic composition and school performances

Why does the ethnic composition of schools or classes affect student performance? Studies propose several explanations for the effect of the ethnic composition. Two distinct perspectives are relevant: the teaching and the peer group perspective.

First, it has been argued from a teaching perspective that a higher proportion of migrant-origin children can lead to lower educational performances due to lowering the standards (Rosenthal and Jacobsen 1968). The proportion of minority pupils may, however, also influence the educational performances positively, because teachers are likely to specialize to the needs of the minority pupils (Peetsma et al. 2006). Although the growth of the proportion of migrant-origin children may lead to specialization, it may also lead to teaching problems concerning instructional time for a greater number of ethnic groups (Dronkers and Van der Velden 2013; Maestri, 2011a). Moreover, teachers need to adapt their teaching style to the needs of a diverse set of pupils (Van Ewijk and Sleegers 2010b).

Second, from the peer group perspective researchers propose that ethnic diversity can enrich students through communication, for instance, if the information about the culture of one ethnic group is relevant for the other group (Lazear 1998). Also, the size of the ethnic groups could influence school performance, as smaller ethnic groups have stronger incentives to adapt to the majority culture (Lazear 1999). Smaller ethnic groups could then lead to better understanding instructions because the instructional language is mostly determined by the majority (Maestri, 2011a). However, the existence of small ethnic groups may also lead to lower school achievement due to a mechanism of reduced feelings of ethnic identification (O'Reilly, Williams and Barsade 1997). Interethnic contacts may lead to more interethnic tensions, which could negatively influence academic performance (Hoxby 2000). Finally, the pupils' language development may be inhibited by a higher number of interethnic contacts due to fewer contacts with pupils having the host country language as their mother tongue (Driessen 2002).

The various explanations of the effect of the ethnic composition on school performances show that researchers refer to four distinct elements of the ethnic composition: the proportion of migrant-origin children, the number of ethnic groups, the size of the ethnic groups, and the number of interethnic contacts.

Proportion of migrant-origin children

The score of migrant-origin students might be positively influenced by the specialization to the needs of migrant-origin students of the teachers in school classes with a high share of migrant-origin students. Nevertheless, two other mechanisms might explain a negative effect of a higher ethnic share on school performance. First, besides this positive effect, we expect a negative influence of lower expectations (Rosenthal and Jacobsen 1968) of teachers in classes with a higher share. Second, a higher proportion of migrant-origin children leads to a lower chance of contacts with native-origin pupils with higher skills of the destination country language. Consequently, we expect in our *proportion of migrant-origin children hypothesis* for both migrant-origin and native-origin pupils in primary education due to the two negative mechanisms that:

A higher proportion of migrant-origin children is associated to lower school performance.

Number of origin groups

A study of Driessen (2002) examined the proportion of ethnic minority youth and the number of origin groups as indicators of school composition. The study shows for both math and reading no influence of the number of origin groups on the school performances in Grades 4 and 8 in Dutch primary education. The number of origin groups does not directly relate to the group sizes and the opportunity structure of interethnic contacts. Rather, the number of groups is usually considered important because of the instructional problems that may arise from teaching a large number of different groups. The study of Driessen shows no significant effect of the number of origin groups on the school performances in primary education. One reason why no association was found between student achievement and the number of groups may be that teachers are able to specialize to cater the needs of the different groups of migrant-origin pupils. Another reason could be that the instructional needs do not differ a lot between different origin groups. Furthermore, Lazear (1998) argued that ethnic groups can enrich students if the information about the culture of one ethnic group is relevant for the other group. Nevertheless, the information that other origin groups could supply is probably not relevant for all school performances. Furthermore, if the information is relevant for the other group, the use of this information is only structurally implemented in some curricula (Svalberg 2007).

Yet, with our data we would like to put the *educational instruction hypothesis* to another test, which states:

There is a negative association between the number of origin groups and school performance.

Ethnic diversity

Recent studies have also taken into account the composition of the class with regard to the sizes and the number of different origin groups using an ethnic diversity variable based on the Herfindahl index. Ethnic diversity measured this way is based on both the proportions of the separate origin groups and the number of the origin groups (Dronkers and Van der Velden 2013). A low ethnic diversity index refers to fewer relatively small origin groups and a high ethnic diversity index to more relatively large origin groups. Because ethnic diversity contains both the number and the size of the origin groups, ethnic diversity refers both to the earlier mentioned educational instruction mechanisms and to peer group influences. Larger origin groups might lead to both positive and negative peer group influences on school performances. Larger origin groups might lead to positive influences on school performances due to a mechanism of stronger feelings of ethnic identification (O'Reilly et al. 1997). Nevertheless, these larger ethnic groups also give smaller incentives to adapt the culture of the destination country. According to Maestri (2011b), this may lead to more problems in understanding instructions. As we demonstrate in Appendix A, ethnic diversity also directly relates to the relative number of possible interethnic contacts. This relatively higher number of possible interethnic contact could lead to more interethnic tensions and conflicts (Hoxby 2000).

We especially expect a decisive influence of the combination of both negative peer group and instruction mechanisms of diversity on student achievement. Therefore, we formulate the *diversity hypothesis* as follows:

A higher ethnic diversity is associated to lower school performance for both migrant- and native-origin pupils.

2.4. Data and variables

The COOL data

The analyses have been carried out using COOL data funded by The Netherlands Organisation for Scientific Research (NWO) and the Dutch Ministry of Education, Culture and the Sciences.[2] The information in the COOL survey data is both rich and relatively large. The primary school information has been gathered by two Dutch institutes: the Kohnstamm Institute (KI) and the Institute for Applied Social Sciences (ITS). For our study, we used a school-based survey of 38,060 pupils from 550 primary schools in the Netherlands (Driessen et al. 2009). We used the first available wave in primary education, which was collected in 2008 and includes results of pupils in Grades 2, 5, and 8 (ages mostly around 5/6, 8/9 and 11/12).[3]

We had the use of the information of 36,796 pupils; this means that we lost 2% of our respondents due to missing values on parental education and origin. Furthermore, for 8% of the remaining native-origin pupils and 9% of the pupils with a migration background, the mathematics test score is missing. In Appendix B, we show the difference between the pupils with math test scores and without math test scores on a number of background variables. With respect to the pupils without valid information on math scores, the first-generation migrant-origin pupils in Grade 5 and migrant-origin pupils with parents with a lower education in Grade 8 are overrepresented. Nevertheless, all origins and education levels are represented in both the missing group and the available group. Therefore, we expect hardly any influence of the missing data on our outcomes.

It should be noted that the data have been gathered by grade and not by school class. If pupils were part of "combination classes" of multiple grades, we collected group-level information about the Grades 2, 5, or 8 fraction of the class. We have excluded all classes with fewer than five pupils to remove the cases with unreliable group-level variables, covering another percent of the pupils. Therefore, the total number of pupils with math scores in our database is 33,624.

[2] NWO grant numbers 411.20.411 and 411.20.412.

[3] Dutch pupils enrol in Grade 1 at the day they turn 4 years old. Grades 1–2 are comparable to Kindergarten in many other systems, and the final Grade 8 of primary school thus equates to Grade 6 in many other systems.

Variables

Dependent variables

Academic performance. The dependent variable academic performance is a score on the math test developed by the national testing agency Cito. We expect stronger effects for the math scores to language scores, because in general math scores are more strongly related to school class influences than language scores (Creemers, 2007). Nevertheless, we have also included the analysis on reading comprehension, because Dronkers and Van der Velden (2013) mentioned that the results of language skills are more pronounced for pupils with an immigrant background.

The Cito math and reading comprehension tests are nationally standardized. The tests are taken twice every year in most primary schools in the Netherlands. The COOL dataset contains the first test of the school year. The test scores are used by teachers and researchers to monitor the development of the individual pupils. Furthermore, the Dutch Inspectorate of Education uses the test scores to assess and compare the quality of primary schools.[4]

Class level variables

Proportion of migrant-origin children of the school class. We computed the proportion of migrant-origin children of the school class using the percentage of migrant pupils in the class. This includes first- and second-generation migrant-origin children, using the official definition of Statistics Netherlands which is based on the country of birth of child and/or parent(s).

Ethnic diversity. Using the number of pupils per origin caught up in every class, we computed an inverted Herfindahl index of ethnic diversity. We calculated the index as follows: 1– ((proportion origin group 1)2 + (proportion origin group 2)2 + … + (proportion origin group n)2). Although we argued that the proportion of migrant-origin children and ethnic diversity are concepts that we should distinguish on theoretical and empirical grounds, the use of both variables could lead to a problem of collinearity. This problem occurs due to the strong correlation between proportion of migrant-origin children and the ethnic diversity of r = 0.93 at the school class level for native-origin children and r = 0.85 for migrant-origin children. Therefore, a quadratic model was estimated on the class-level data, predicting diversity as a function of the proportion of migrant-origin children. We then took the residuals of this regression model, thereby measuring the difference between ethnic diversity as is observed in a class relative to the predicted diversity based on the quadratic model. The advantage of this method is that the residualized diversity measure is independent of the proportion of pupils

[4] In Grade 5, schools could use two different versions of the Cito math test. The two versions were made comparable using conversion tables made by Cito.

with a migration background, as independence of the residual with X variables is an assumption of ordinary least squares regression. Our measurement thus does not assess diversity per se, but the level of diversity given a particular proportion of children of non-Dutch descent. Such a model may underestimate the impact of diversity, yet we do think that this measure associates directly to the conceptual distinction between the share of migrant-origin children and the diversity among them. Classes with similar numbers of migrant-origin pupils vary with regard to the diversity of the groups, and our measure conceptualizes such a "conditional" interpretation of diversity. The residualization process may also be done in reversed fashion (with proportion of migrant-origin children residualized on diversity), which would give more leeway to Diversity as a predictor variable. The resulting interpretation of such a reversed residualization would be that, given a particular level of diversity, a larger proportion of migrant-origin children may be related to school performance. Such an interpretation is, in our view, slightly less desirable.

In Appendix C, we show how migrant-origin share and ethnic diversity are related and how we computed the residuals of ethnic diversity. Furthermore, we will show in the section A test on multicollinearity how both the use of migrant-origin share and non-residualized ethnic diversity in one model leads to possible problems of collinearity. This section will also show that the use of both migrant-origin share and residualized ethnic diversity solves the collinearity problem.

Number of origin groups per class. We calculated the number of origin groups per class, using information at the individual level about the origin of the pupils. Similar to our approach on the diversity index, we also calculated the number of origin groups residualized to the proportion of migrant-origin children in a class. This is necessary as also the number of origin groups is strongly correlated to the share of migrant-origin children.

Percentage of parents with higher education in the class. The COOL dataset contains two measurements of the parental education: the parental education according to the school and the parental education as mentioned by the parent in the parental questionnaire. The information of the first measurement is estimated by the school and frequently originated from the administration of the school (Driessen, Mulder and Roeleveld 2012). Although the answers of the parental questionnaire might be more recent and have more specified levels, the parental dataset leads to 34% missing values for the parental educational level. Furthermore, the response of the parental questionnaire is skewed on social ethnical background (Driessen et al. 2009). Consequently, the choice for the parental education according to the parental questionnaire would lead to a selection of missing data and problems to calculate the percentage of parents with higher education at the class level. Therefore, we prefer the educational measurement of the school that contains only to 5% missing values of the parental education. Nevertheless, we underpin that our indicator of the parental educational level is an estimated variable in the cases where schools did not originate their data from their administration. We calculated the percentage of parents with higher education in the class, defined as tertiary level vocational college (HBO) or university. In some classes, no information on parents' education was collected. We omitted those classes from the analysis (321 pupils).

Individual level variables
Origin background. Using the method applied by Levels and Dronkers (2008), we took the country of birth of the child, the father, and the mother as indicators for origin. If two of these three indicators had the same country of birth but not the country of destination, we took that country as origin country. However, when there were not two of the same classifications available, the country of birth of the mother was taken to represent the origin country. The COOL dataset contains also two measurements for the origin country: according to the school and as mentioned in the parental questionnaire. The parental questionnaire is, for instance, missing 36% of the information about the country of origin of the mother and the school measurement only 4%. Therefore, we prefer also for the origin country the measurement according to the school, because otherwise we would lose a large number of pupils. Because of the small group sizes, we put Moluccan pupils together with Surinamese and Antillean pupils as former colonies, and Polish, former Soviet, and former Yugoslavia as Eastern Europe. We did compute the ethnic diversity and number of origin countries on the basis of all individual countries. The country of origin is missing for 943 pupils.

Migration generation. Using information on the countries of birth of the pupils and their parents, we constructed a dichotomous variable. We define first-generation migrant-origin pupils as pupils who were born abroad and whose parents were also born outside the Netherlands. We define second-generation migrant-origin pupils as pupils who were born in the Netherlands and of whom at least one parent was born abroad.

Parental educational level. Parental educational level is measured as the highest level of either of both parents according to the school. The educational levels that are distinguished are primary education (low); lower secondary education; upper secondary education (vocational, general, or academic); and tertiary education(vocational college or university). We include the dummy "parental educational level missing", representing around 1% of the pupils.

Female. We use a dichotomous variable to classify gender. Boys are the reference group. Of 1% of the pupils, we have no information on gender. The mathematics test results of this group did not significantly differ from those of the children whose gender was known. This group has been assigned the value 0.5 on the gender dummy.

Descriptive statistics
Table 2.1 reports the means and standard deviations for migrant-origin pupils (first and second generation together) and native-origin pupils of all variables in all years. We see that in all years math scores are lower for migrant pupils than for native-origin pupils. The difference in the dataset in test scores between migrant-origin pupils and native-origin pupils declines between Years 5 and 8. The table furthermore shows that migrant-origin pupils have classes with a higher level of ethnic diversity and a higher share of migrant-origin children.

2.5 Models and results

Analytical design
Given the nested structure of the data, with individual pupils nested in classes, which are nested in grades, we used multilevel analysis with three levels.

We ran separate analyses for native-origin pupils and pupils with a migrant-origin. Our first Model 1a in Table 2.2 only contains the proportion of migrant-origin children and the ethnic diversity of the class as predictor variables. In Model 1b, we have replaced the variable ethnic diversity by the residualized version of that variable. We use both Models 1a and 1b because these models show the influence of the possible multicollinearity on the parameter estimates. In the following section, we will show why we prefer Model 1b to Model 1a. In Model 2, we have added all explanatory variables except the residuals of ethnic diversity and the residuals of the number of origin groups. With this model, we can test whether the addition of the residualized variables in Models 3 and 4 improve the model fit. Our third model also contains the residualized ethnic diversity index. Finally, our last model contains all explanatory variables, but we have replaced the residualized ethnic diversity score by the similarly residualized number of origin groups.

Table 2.1: Means and standard deviations for migrant-origin students and native-origin students with math scores[a]

	Grade 2				Grade 5				Grade 8			
	Migrant-origin		Native-origin		Native-origin		Native-origin		Migrant-origin		Native-origin	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
% migrant-origin students of class	63.15	28.10	14.57	19.85	63.56	29.46	13.51	18.81	62.64	29.62	13.95	18.77
Origin diversity of class	0.60	0.18	0.20	0.23	0.59	0.20	0.20	0.22	0.59	0.19	0.20	0.22
Residualized ethnic diversity of class	0.00	0.14	–0.00	0.08	0.00	0.17	0.00	0.08	0.01	0.15	0.00	0.08
% parents with tertiary education of class	18.96	18.51	33.58	22.05	16.76	16.88	32.49	20.36	16.14	15.22	30.02	19.69
Number of origins in class	4.48	1.55	2.27	1.50	4.87	1.63	2.52	1.62	4.97	1.69	2.66	1.73
Residualized origins in class	0.29	1.43	0.12	0.88	0.21	1.58	0.16	0.98	0.22	1.65	0.16	1.09
Education missing	0.01	0.10	0.01	0.09	0.02	0.13	0.01	0.12	0.02	0.14	0.01	0.12
Low parental education	0.28	0.45	0.02	0.13	0.30	0.46	0.02	0.12	0.30	0.46	0.02	0.12
Lower secondary parental education	0.23	0.42	0.16	0.37	0.24	0.43	0.18	0.38	0.25	0.43	0.20	0.40
Upper secondary parental education	0.30	0.46	0.48	0.50	0.30	0.46	0.46	0.50	0.27	0.45	0.47	0.50
Tertiary parental education	0.18	0.39	0.34	0.47	0.15	0.36	0.33	0.47	0.15	0.36	0.30	0.46
Female	0.47	0.50	0.49	0.50	0.50	0.50	0.50	0.50	0.48	0.50	0.49	0.50
First-generation migrant-origin	0.06	0.23			0.09	0.28			0.14	0.34		
Turkish origin	0.24	0.43			0.27	0.44			0.28	0.45		
Moroccan origin	0.24	0.43			0.25	0.43			0.21	0.41		
Western origin	0.07	0.25			0.06	0.23			0.06	0.23		
Eastern Europe origin	0.05	0.21			0.05	0.21			0.05	0.22		
Chinese origin	0.01	0.11			0.01	0.12			0.02	0.12		
Iraqi origin	0.03	0.16			0.02	0.13			0.03	0.16		
Afghan origin	0.02	0.13			0.01	0.11			0.02	0.15		
Somali-origin	0.03	0.16			0.02	0.13			0.01	0.11		
Other country origin	0.20	0.40			0.18	0.39			0.17	0.37		
Former colony origin	0.12	0.32			0.13	0.34			0.15	0.36		
Math score	51.87	11.88	58.56	13.04	63.60	15.72	71.96	14.97	114.42	9.52	117.12	9.40
N students	3426		8803		3056		8290		2719		7330	
N classes	719		991		505		677		438		580	
N schools	369		494		383		495		362		477	

[a]Only reported for students with valid scores on the mathematics test. SOURCE: -COOL 2008, own computation.

Table 2.2: The effects of the ethnic composition on math score of native-origin students and migrant-origin students: diagnosing collinearity

	Grade 2			Grade 5				Grade 8			
	Model 1a		Model 1b	Model 1a		Model 1b		Model 1a		Model 1b	
		VIF			VIF		VIF		VIF		VIF
Native-origin											
Constant	59.2**		59.3**	73.0**		73.3**		118.0**		117.6**	
	(0.4)		(0.4)	(0.4)		(0.4)		(0.3)		(0.3)	
% migrant-origin students of class	–7.8**	7.0	–5.9**	–13.3**	7.4	–9.4**	1.0	–0.5	7.2	–5.2**	1.0
	(2.9)		(1.0)	(3.8)		(1.2)		(2.6)		(0.9)	
Ethnic diversity of class	1.8	7.0		3.9	7.4			–4.7	7.2		
	(2.7)			(3.5)				(2.4)			
Residualized ethnic diversity of class			–1.6			2.2	1.0			–8.7	1.0
			(6.7)			(10.2)				(6.9)	
Log likelihood	69259.1		69259.5	67777.7		67777.7		53006.3		53008.4	
N students	8803			8290				7330			
N classes	991			677				580			
N schools	494			495				477			
Migrant-origin											
Constant	53.7**		53.6**	68.8**		68.4**		116.2**		115.6**	
	(0.9)		(0.7)	(1.1)		(0.8)		(0.7)		(0.5)	
% migrant-origin students of class	–2.2	3.5	–2.5*	–6.4**	3.5	–7.3**	1.0	–0.4	3.7	–1.9*	1.0
	(1.7)		(1.1)	(2.1)		(1.4)		(1.4)		(0.9)	
Ethnic diversity of class	–0.5	3.5		–1.6	3.5			–2.3	3.7		
	(2.4)			(2.9)				(2.0)			
Residualized ethnic diversity of class			–0.1			–3.4	1.0			–2.0	1.0
						(5.0)				(4.1)	
Log likelihood	26248.5		26248.6	25229.2		25229.2		19803.8		19804.9	
N students	3426			3056				2719			
N classes	719			505				438			
N schools	369			383				362			

SOURCE. - COOL 2008, own computation.
NOTE. -Standard errors between brackets.
$^{**}p < 0.01$; $^{*}p < 0.05$.

A test on multicollinearity

Due to the strong correlation between migrant-origin share and ethnic diversity, a diagnosis of multi- collinearity was performed by examining the VIF.[5] The VIF quantifies the degree to which estimated standard errors of regression coefficients are influenced by linear relationships among predictor variables (Kleinbaum et al. 2008).

Table 2.2 reports the results from our multilevel regression for Models 1a and 1b and ordinary least squares (OLS) VIF statistics as an indication to assess multicollinearity. The statistics show for the model that contains both the proportion of migrant-origin children and the ethnic diversity a maximum VIF of 7.2 for the native-origin pupils and a maximum VIF of 3.7 for the migrant-origin children. As we expected, the VIFs of Model 1b are all one, because the residualized score on ethnic diversity does not correlate with the proportion of migrant-origin children.[6]

A diagnosis of multicollinearity using VIF scores depends on the chosen threshold of an acceptable VIF. Earlier research used a VIF of 4, 5, or 10 as rule of the thumb to indicate serious multicollinearity (O'Brien 2007). High values of VIF lead to inflated standard errors of regression coefficients, impacting the statistical significance of regression coefficients. We also compare the standard errors and regression coefficients between Models 1a and 1b. Table 2.2 shows that the standard errors of the proportion of migrant-origin for native-origin students meanly inflate between Models 1b and 1a with 199% and for the migrant-origin children on average with 54% due to the high correlation between the independent variables. Furthermore, the table shows for native-origin students in Grade 8 a parameter of –5.2 for the proportion of migrant-origin children using the residualized variable of diversity, whereas the model with the high VIF scores shows an effect of –0.5. All model comparisons show higher standard errors and in most cases lower parameter estimates for the proportion of migrant-origin children if the model was estimated with the unresidualized measure of ethnic diversity. Consequently, we choose Model 1b with the residualized ethnic diversity index. Furthermore, in our fourth model we also take the residualized version of the number of origin groups, because migrant-origin share and the number of origin groups also correlate strongly.

[5] $VIF = -\frac{1}{1 - R_i^2}$

[6] VIF statistics are possible using OLS; nevertheless, VIFs are not available in multilevel analysis due to the lack of R2. Because we have different levels in the other models, VIF's are not available for the other models. Due to the low correlation of the other variables, we know that multicollinearity is only somewhat stronger in the multilevel models with more variables.

Table 2.3a: The effects of the ethnic composition on math score of native-origin students

	Grade 2			Grade 5			Grade 8		
	Model 2	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**
Constant	61.8**	61.8**	61.8**	79.3**	79.3**	79.3**	121.5**	121.5**	121.5**
	(0.6)	(0.6)	(0.6)	(0.7)	(0.7)	(0.7)	(0.5)	(0.5)	(0.5)
Class level									
Proportion migrant-origin of class	–4.0**	–4.0**	–4.1*	–5.5**	–5.5**	–5.5**	–3.0**	–2.9**	–2.9**
	(1.1)	(1.1)	(1.1)	(1.2)	(1.2)	(1.2)	(0.9)	(0.9)	(0.9)
Residualized ethnic diversity of class		–1.9			5.4			–9.2	
		(6.6)			(9.7)			(6.7)	
Proportion parents with tertiary education of	0.1	0.1	0.1	1.3	1.3	1.3	1.1	1.2	1.1
of class	(1.2)	(1.2)	(1.2)	(1.4)	(1.4)	(1.4)	(1.1)	(1.1)	(1.1)
Residualized number of origin groups			0.2			0.1			–0.1
			(0.3)			(0.3)			(0.2)
Individual characteristics									
Parental education missing	–5.6**	–5.6**	–5.6**	–6.3**	–6.3**	–6.3**	–3.6**	–3.6**	–3.6**
	(1.6)	(1.6)	(1.6)	(1.5)	(1.5)	(1.5)	(1.0)	(1.0)	(1.0)
Low parental education	–8.1**	–8.1**	–8.0**	–12.9**	–12.9**	–12.9**	–6.7**	–6.8**	–6.7**
	(1.1)	(1.1)	(1.1)	(1.3)	(1.3)	(1.3)	(0.9)	(0.9)	(0.9)
Lower secondary parental education	–6.6**	–6.6**	–6.6**	–9.9**	–9.9**	–9.9**	–6.4**	–6.4**	–6.4**
	(0.4)	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)	(0.3)	(0.3)	(0.3)
Upper secondary parental education	–3.6**	–3.6**	–3.6**	–4.8**	–4.8**	–4.8**	–3.4**	–3.4**	–3.4**
	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)	(0.2)	(0.2)	(0.2)
Tertiary parental education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.5	0.5	0.5	–5.3**	–5.3**	–5.3**	–2.8**	–2.8**	–2.8**
	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.2)	(0.2)	(0.2)

Table 2.3a: Continued

	Grade 2			Grade 5			Grade 8		
	Model 2	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**
Variance									
Individual level	133.1**	133.1**	133.1**	174.6**	174.6**	174.6**	67.4**	67.4**	67.4**
	(2.1)	(2.1)	(2.1)	(2.8)	(2.8)	(2.8)	(1.2)	(1.2)	(1.2)
	(2.1)	(2.1)	(2.1)	(2.8)	(2.8)	(2.8)	(1.2)	(1.2)	(1.2)
Class level	13.4**	13.4**	13.4**	17.8**	17.8**	18.0**	3.3**	3.1**	3.2**
	(1.9)	(1.9)	(1.9)	(3.3)	(3.3)	(3.3)	(1.2)	(1.2)	(1.2)
School level	16.6**	16.6**	16.6**	9.6**	9.5**	9.4**	12.5**	12.5**	12.4**
	(2.4)	(2.4)	(2.4)	(3.2)	(3.2)	(3.2)	(1.7)	(1.7)	(1.7)
Log likelihood	68958.7	68958.6	68958.3	66979.0	66978.7	66978.8	52348.6	52346.7	52348.5
N students	8803			8290			7330		
N classes	991			677			580		
N schools	494			495			477		

SOURCE. - COOL 2008, own computation.
NOTE. -Standard errors between brackets.
$^{**}p < 0.01$; $^{*}p < 0.05$.

Table 2.3b: The effects of the ethnic composition on math score of migrant-origin students

	Grade 2			Grade 5			Grade 8		
	Model 2	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**
Constant	52.6**	52.6**	52.6**	69.4**	69.3**	69.3**	114.7**	114.7**	114.8**
	(0.9)	(0.9)	(1.2)	(1.7)	(1.7)	(1.7)	(1.1)	(1.1)	(1.1)
School level									
Proportion migrant-origin of class	–1.6	–1.6	1.6	–3.8*	–3.7*	–3.7*	1.1	1.2	1.1
	(1.2)	(1.2)	(1.2)	(1.6)	(1.6)	(1.6)	(1.0)	(1.0)	(1.0)
Residualized ethnic diversity of class		–3.4 (3.8)			–5.0 (5.0)			–3.6 (4.0)	
Proportion parents with tertiary	4.0*	4.2*	4.1*	0.6	0.7	0.6	3.6	3.7	3.6
education of class	(1.8)	(1.8)	(1.8)	(2.6)	(2.6)	(2.6)	(1.9)	(1.9)	(1.9)
Residualized number of origin groups			–0.1			0.2			0.1
			(0.3)			(0.3)			(0.2)
Individual characteristics									
Parental education missing	–3.1	–3.1	–3.1	–4.2	–4.2	–4.2	–4.3**	–4.3**	–4.3**
	(2.0)	(2.0)	(2.0)	(2.2)	(2.2)	(2.2)	(1.4)	(1.4)	(1.4)
Low parental education	–4.2**	–4.2**	–4.2**	–5.0**	–5.0**	–5.0**	–3.6**	–3.6**	–3.6**
	(0.6)	(0.6)	(0.6)	(0.9)	(0.9)	(0.9)	(0.6)	(0.6)	(0.6)
Lower secondary parental education	–3.9**	–3.9**	–3.9**	–5.3**	–5.2**	–5.3**	–3.5**	–3.5**	–3.5**
	(0.6)	(0.6)	(0.6)	(0.9)	(0.9)	(0.9)	(0.6)	(0.6)	(0.6)
Upper secondary parental education	–1.9**	–1.9**	–1.9**	–2.4**	–2.4**	–2.4**	–1.8**	–1.8**	–1.8**
	(0.6)	(0.6)	(0.6)	(0.9)	(0.9)	(0.9)	(0.6)	(0.6)	(0.6)
Tertiary parental education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	–0.0	–0.0	–0.0	–5.6**	–5.7**	–5.7**	–2.4**	–2.4**	–2.4**
	(0.4)	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)	(0.3)	(0.3)	(0.3)
First-generation migrant	–0.9	–0.9	–0.9	–1.3	–1.4	–1.3	–1.6**	–1.6**	–1.6**
	(0.9)	(0.9)	(0.9)	(1.0)	(1.0)	(1.0)	(0.5)	(0.5)	(0.5)
Turkish origin	–0.8	–0.8	–0.8	3.1**	3.1**	3.1**	2.5**	2.5**	2.5**
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(0.6)	(0.6)	(0.6)

Table 2.3b: Continued

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Moroccan origin	–0.4	–0.4	–0.4	2.8**	2.8**	2.8**	1.9**	1.9**	1.9**
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(0.6)	(0.6)	(0.6)
Western origin	4.9**	4.9**	4.9**	5.7**	5.7**	5.7**	2.2*	2.1*	2.2*
	(1.0)	(1.0)	(1.0)	(1.4)	(1.4)	(1.4)	(0.9)	(0.9)	(0.9)
Eastern-European origin	–0.2	–0.2	–0.2	5.3**	5.3**	5.3**	3.0**	3.0**	3.0**
	(1.1)	(1.1)	(1.1)	(1.5)	(1.5)	(1.5)	(0.9)	(0.9)	(0.9)
Chinese origin	5.2**	5.2**	5.2**	12.6**	12.6**	12.6**	8.3**	8.4**	8.3**
	(1.8)	(1.8)	(1.8)	(2.4)	(2.4)	(2.4)	(1.5)	(1.5)	(1.5)
Iraqi origin	–0.1	–0.1	–0.1	4.4*	4.4*	4.3*	5.6**	5.5**	5.5**
	(1.3)	(1.3)	(1.3)	(2.1)	(2.1)	(2.1)	(1.3)	(1.2)	(1.2)
Afghan origin	0.8	0.8	0.8	5.4*	5.4*	5.4*	5.6**	5.7**	5.6**
	(1.6)	(1.6)	(1.6)	(2.6)	(2.6)	(2.6)	(1.3)	(1.3)	(1.3)
Somali origin	1.6	1.6	1.6	4.5*	4.5*	4.5*	2.0	2.0	2.0
	(1.3)	(1.3)	(1.3)	(2.1)	(2.1)	(2.1)	(1.6)	(1.6)	(1.6)
Other country origin	0.9	0.9	0.9	3.7**	3.7**	3.7**	3.5**	3.5**	3.5**
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(0.6)	(0.6)	(0.6)
Former colony origin	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Variance									
Individual level	101.0**	101.0**	101.0**	190.6**	190.6**	190.7**	71.8**	71.8**	71.8**
	(2.7)	(2.7)	(2.7)	(5.2)	(5.2)	(5.2)	(2.1)	(2.1)	(2.1)
Class level	17.4**	17.4**	17.4**	10.6*	10.7*	10.8*	1.7	1.9	1.6
	(3.0)	(3.0)	(3.0)	(4.8)	(4.8)	(4.8)	(1.7)	(1.8)	(1.7)
School level	14.9**	14.8**	14.9**	23.7**	23.7**	23.4**	11.7**	11.3**	11.8**
	(3.2)	(3.2)	(3.2)	(5.9)	(5.9)	(5.9)	(2.4)	(2.3)	(2.3)
Log likelihood	26090.2	26089.3	26090.1	25020.7	25019.7	25020.3	19611.5	19610.7	19611.4
N students	3426			3056			2719		
N classes	719			505			438		
N schools	369			383			362		

SOURCE. - COOL 2008, own computation.
NOTE. -Standard errors between brackets.
$^{**}p < 0.01$; $^{*}p < 0.05$.

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Table 2.4a: The effects of the ethnic composition on reading comprehension of students with a native-origin students[a]

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Moroccan origin	–0.4	–0.4	–0.4	2.8**	2.8**	2.8**	1.9**	1.9**	1.9**
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(0.6)	(0.6)	(0.6)
Western origin	4.9**	4.9**	4.9**	5.7**	5.7**	5.7**	2.2*	2.1*	2.2*
	(1.0)	(1.0)	(1.0)	(1.4)	(1.4)	(1.4)	(0.9)	(0.9)	(0.9)
Eastern-European origin	–0.2	–0.2	–0.2	5.3**	5.3**	5.3**	3.0**	3.0**	3.0**
	(1.1)	(1.1)	(1.1)	(1.5)	(1.5)	(1.5)	(0.9)	(0.9)	(0.9)
Chinese origin	5.2**	5.2**	5.2**	12.6**	12.6**	12.6**	8.3**	8.4**	8.3**
	(1.8)	(1.8)	(1.8)	(2.4)	(2.4)	(2.4)	(1.5)	(1.5)	(1.5)
Iraqi origin	–0.1	–0.1	–0.1	4.4*	4.4*	4.3*	5.6**	5.5**	5.5**
	(1.3)	(1.3)	(1.3)	(2.1)	(2.1)	(2.1)	(1.3)	(1.2)	(1.2)
Afghan origin	0.8	0.8	0.8	5.4*	5.4*	5.4*	5.6**	5.7**	5.6**
	(1.6)	(1.6)	(1.6)	(2.6)	(2.6)	(2.6)	(1.3)	(1.3)	(1.3)
Somali origin	1.6	1.6	1.6	4.5*	4.5*	4.5*	2.0	2.0	2.0
	(1.3)	(1.3)	(1.3)	(2.1)	(2.1)	(2.1)	(1.6)	(1.6)	(1.6)
Other country origin	0.9	0.9	0.9	3.7**	3.7**	3.7**	3.5**	3.5**	3.5**
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(0.6)	(0.6)	(0.6)
Former colony origin	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Variance									
Individual level	101.0**	101.0**	101.0**	190.6**	190.6**	190.7**	71.8**	71.8**	71.8**
	(2.7)	(2.7)	(2.7)	(5.2)	(5.2)	(5.2)	(2.1)	(2.1)	(2.1)
Class level	17.4**	17.4**	17.4**	10.6*	10.7*	10.8*	1.7	1.9	1.6
	(3.0)	(3.0)	(3.0)	(4.8)	(4.8)	(4.8)	(1.7)	(1.8)	(1.7)
School level	14.9**	14.8**	14.9**	23.7**	23.7**	23.4**	11.7**	11.3**	11.8**
	(3.2)	(3.2)	(3.2)	(5.9)	(5.9)	(5.9)	(2.4)	(2.3)	(2.3)
Log likelihood	26090.2	26089.3	26090.1	25020.7	25019.7	25020.3	19611.5	19610.7	19611.4
N students	3426			3056			2719		
N classes	719			505			438		
N schools	369			383			362		

Table 2.4a: Continued

	Grade 2			Grade 5			Grade 8		
	Model 2	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**
School level	11.5**	11.5**	11.6**	5.6**	5.6**	5.6**	6.0	6.0	6.1
	(1.5)	(1.5)	(1.5)	(2.0)	(2.0)	(2.0)	(4.0)	(3.9)	(3.9)
Log likelihood	63621.8	63621.7	63621.3	64229.2	64229.2	64229.0	62060.2	62060.2	62058.5
N students	8826			8047			7563		
N classes	990			670			590		
N schools	496			490			481		

SOURCE. - COOL 2008, own computation.
NOTE. – [a]For Grade 2, the reading comprehension test is not available. We used the Cito language score of Grade 2 instead. Because the language score contains both oral communication and early literacy, the results of Grade 2 are not directly comparable to those of Grades 5 and 8. Standard errors between brackets.
**$p < 0.01$; *$p < 0.05$.

Table 2.4b: The effects of the ethnic composition on reading comprehension of migrant-origin students

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Constant	69.0**	68.9**	69.0**	22.7**	22.6**	22.7**	52.8**	52.7**	52.8**
	(0.9)	(0.9)	(0.9)	(1.3)	(1.3)	(1.3)	(1.6)	(1.6)	(1.6)
School level									
Proportion migrant-origin of class	–1.1	–1.0	–1.1	–0.9	–0.9	–1.0	–2.1	–1.9	–2.0
	(0.9)	(0.9)	(0.9)	(1.1)	(1.1)	(1.1)	(1.5)	(1.5)	(1.5)
Residualized ethnic diversity of class		–3.7			–3.3			–12.7*	
		(2.8)			(3.1)			(5.3)	
Proportion parents with tertiary	2.7*	2.8*	2.7*	5.1**	5.1**	5.1**	5.4*	5.5*	5.6*
education of class	(1.4)	(1.4)	(1.4)	(1.8)	(1.8)	(1.8)	(2.6)	(2.6)	(2.6)
Residualized number of origin groups			–0.3			–0.3			–0.3
			(0.2)			(0.2)			(0.3)
Individual characteristics									
Parental education missing	–3.0	–3.0	–2.9	–5.0**	–5.0**	–5.0**	–7.3**	–7.3**	–7.3**
	(1.6)	(1.6)	(1.6)	(1.8)	(1.8)	(1.8)	(2.1)	(2.1)	(2.1)
Low parental education	–3.5**	–3.5**	–3.5**	–4.8**	–4.8**	–4.8**	–6.9**	–6.8**	–6.9**
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)
Lower secondary parental education	–2.2**	–2.2**	–2.2**	–4.8**	–4.8**	–4.8**	–7.1**	–7.1**	–7.1**
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)
Upper secondary parental education	–1.0*	–1.0*	–1.0*	–2.4**	–2.4**	–2.4**	–3.2**	–3.2**	–3.2**
	(0.4)	(0.5)	(0.4)	(0.7)	(0.7)	(0.7)	(0.9)	(0.9)	(0.9)
Tertiary parental education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.9**	0.9**	0.9**	2.3**	2.3**	2.3**	2.6**	2.6**	2.6**
	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)
First-generation migrant	–1.6*	–1.6*	–1.6*	–1.3	–1.3	–1.3	–1.4	–1.4	–1.4
	(0.7)	(0.7)	(0.7)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)
Turkish origin	–2.6**	–2.6**	–2.6**	–2.1*	–2.0*	–2.1*	–2.2*	–2.2*	–2.2*
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)
Moroccan origin	–0.7	–0.8	–0.8	–0.5	–0.5	–0.6	0.5	0.4	0.4
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(1.0)	(0.9)	(1.0)

Table 2.4b: continued

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Western origin	3.3**	3.3**	3.3**	2.3*	2.3*	2.2	2.5	2.5	2.5
	(0.8)	(0.8)	(0.8)	(1.2)	(1.2)	(1.2)	(1.4)	(1.4)	(1.4)
Eastern-European origin	–1.8*	–1.7*	–1.7*	–0.1	–0.1	–0.1	3.2*	3.2*	3.2*
	(0.8)	(0.8)	(0.8)	(1.2)	(1.2)	(1.2)	(1.4)	(1.4)	(1.4)
Chinese origin	–1.5	–1.5	–1.5	5.0**	5.1**	5.1**	4.4*	4.5*	4.5*
	(1.4)	(1.4)	(1.4)	(1.9)	(1.9)	(1.9)	(2.2)	(2.3)	(2.2)
Iraqi origin	–1.5	–1.4	–1.5	–1.7	–1.7	–1.7	0.3	0.4	0.4
	(1.0)	(1.0)	(1.0)	(1.7)	(1.7)	(1.7)	(1.8)	(1.8)	(1.8)
Afghan origin	–0.7	–0.7	–0.7	1.7	1.7	1.7	5.8**	5.9**	5.8**
	(1.2)	(1.2)	(1.2)	(2.1)	(2.1)	(2.1)	(2.0)	(2.0)	(2.0)
Somali origin	0.0	0.1	0.1	2.6	2.7	2.6	–0.5	–0.5	–0.5
	(1.0)	(1.0)	(1.0)	(1.7)	(1.7)	(1.7)	(2.3)	(2.3)	(2.3)
Other country origin	–0.5	–0.5	–0.5	2.5**	2.5**	2.4**	3.0**	3.0**	3.0**
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(1.0)	(1.0)	(1.0)
Former colony origin	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Variance									
Individual level	60.0**	60.0**	60.0**	123.7**	123.8**	123.7**	176.5**	176.6**	176.5**
	(1.6)	(1.6)	(1.6)	(3.6)	(3.6)	(3.6)	(5.0)	(5.0)	(5.0)
Class level	7.2**	7.3**	7.4**	3.1	3.1	3.0	12.8**	14.7**	13.2**
	(1.5)	(1.5)	(1.5)	(2.6)	(2.6)	(2.6)	(5.5)	(5.7)	(5.6)
School level	12.4**	12.1**	12.0**	5.8*	5.7*	5.9*	9.8	6.5	8.9
	(2.1)	(2.0)	(2.0)	(2.6)	(2.6)	(2.6)	(5.3)	(5.3)	(5.4)
Log likelihood	24392.6	24390.9	24390.3	21209.1	21208.0	21207.3	22669.0	22663.5	22668.1
N students	3441			2751			2801		
N classes	720			492			452		
N schools	371			374			368		

SOURCE. - COOL 2008, own computation.
NOTE. – [a]For Grade 2, the reading comprehension test is not available. We used the Cito language score of Grade 2 instead. Because the language score contains both oral communication and early literacy, the results of Grade 2 are not directly comparable to those of Grades 5 and 8. Standard errors between brackets.
$^{**}p < 0.01$; $^{*}p < 0.05$.

Results

Proportion of migrant-origin children

Tables 2.3a and 2.4a show, for native-origin students in all subjects, a negative effect of the proportion of migrant-origin children on school performance. For migrant-origin pupils, the results of Tables 2.3b and 2.4b show varied outcomes in this regard. For math, Table 2.3b shows a significant effect of –3.7 or –3.8 only in Grade 5. Furthermore, the results on reading comprehension show for migrant-origin children no significant effect of the proportion of migrant-origin children on the test scores. Consequently, we reject the proportion of migrant-origin children hypothesis for the migrant-origin children except for math in Grade 5 and confirm the proportion of migrant-origin children hypothesis for the native-origin pupils.

Number of origin groups

Because neither Table 2.3a nor Table 2.3b show any significant associations between the residualized number of origin groups and math performance, we reject the educational instruction hypothesis (see Driessen 2002, for a similar result). A higher number of origin groups in a class than is typical given the proportion of migrant-origin children is not related to lower math scores. Nevertheless, if we look at reading comprehension, Table 2.4a shows for the native-origin pupils in Grade 8 a significant effect of –0.6 of the number of origin groups on reading comprehension. Therefore, we only found evidence in favour of the educational instruction hypothesis for the reading comprehension for the native-origin pupils in Grade 8.[7]

Inspection of the log likelihood ratio in Tables 2.3a, 2.3b, 2.4a, and 2.4b learns that including the number of origin groups residuals (Model 4) led to an improved model fit compared to a model without the number of origin groups (Model 2).

Ethnic diversity residuals

Model 3 in Table 2.3a shows parameter estimates of residualized ethnic diversity of –1.9 in Grade 2, 5.4 in Grade 5, and finally –9.2 in Grade 8 (all for native-origin students). However, none of these negative coefficients is statistically significant at $p < 0.05$. For migrant-origin pupils (Table 2.3b), ethnic diversity is always negatively related to mathematics achievement, although in none of the models in a statistically significant way. Given these non-significant results, the ethnic diversity

[7] We also tested the effect of ethnic diversity residuals and of the number of origin groups residuals for the students on reading vocabulary in Grades 5 and 8. The results show also a significant negative effect for the number of origin groups residuals for native-origin students in Grade 8. However, the results show no significant effects for ethnic diversity residuals and the number of origin groups residuals in the other grades for both native-origin and migrant-origin children. Therefore, we also reject the teaching hypothesis for the native-origin students in Grade 8 for reading vocabulary. Results available on request.

hypothesis is rejected with regard to mathematics.

Tables 2.4a and 2.4b turn the attention to reading comprehension as the dependent variable. For native-origin pupils, we found no significant associations between residualized diversity and reading comprehension, again refuting the ethnic diversity hypothesis. Migrant children, however, are negatively affected by ethnic diversity, in particular in Grade 8 (regression coefficient of –12.7). Consequently, in Grade 8 we see that children of migrant descent have lower performance in reading in school classes with an ethnic diversity that is higher than we expect on the basis of the number of migrant-origin children in a class. We therefore find evidence in favour of the ethnic diversity hypothesis in Grade 8 for reading comprehension for the migrant-origin children.

The log likelihood ratio shows in most cases a better fit when we include ethnic diversity residuals. This, however, does not hold for reading comprehension of native-origin students in Grades 5 and 8.

Should we measure ethnic composition at the class or at the school grade level?
On theoretical grounds, we employed a three-level model (individual, class, school grade) with compositional measures taken at the class level. In most cases, the variance at the class level (within school grades) was significant. Here, we demonstrate whether results are different when the class level was omitted from the research design and compositional measures were instead taken at the school grade level (as has been done in previous research). Appendix D shows the tables of the two-level multilevel analyses. The following differences were encountered.

First, in contrast to our results in Table 2.4a, for the native-origin students in Grade 8 no significant effect of the residualized number of origin groups (at the school grade level) on reading comprehension was found. Also in our original model, the coefficient was small (but significant).

Second, unlike the analyses described above, we found significant negative effects of residualized ethnic diversity for native-origin students in Grade 2, and significant negative effects of the number of origin groups for native-origin students in Grades 2 and 5.

Third, for migrant-origin students the two-level model with measures at the school grade level also shows a significant effect of residualized ethnic diversity in Grade 2. For the migrant-origin students in Grades 2 and 5, significant negative effects were found of the number of origin groups on reading comprehension scores.

In sum, examining compositional measures at the school level (separately by grade) shows slightly stronger effects of diversity indicators on school performance. The discrepancy in the findings may be related to schools having larger diversities within grades than within classes within grades.

2.6 Conclusions and discussion

We empirically explored the association between various indicators of the ethnic composition of school classes on pupils' test scores in mathematics and reading comprehension at different grades in primary school in The Netherlands. Our particular interest was in the associations between academic performance and two distinct characteristics on ethnic compositions of school classes: the proportion of migrant-origin children (first- and second-generation) and the diversity among the different origin groups.

In studying diversity, a further distinction was made between the number of origin groups in a class and a diversity index which includes information about the number of groups and the sizes of the groups jointly. Both variables have been residualized on the proportion of migrant-origin children in a class, implying that these diversity indicators measure the relative diversity given a particular proportion of first- and second-generation ethnic minority children. The diversity index has been associated with a combination of instructional problems and peer group effects, whereas the number of origin groups more clearly relates to instructional problems of diverse classes.

Our results demonstrated that the proportion of migrant-origin children in a class is negatively related to academic performance of native-origin pupils. Pupils of migrant-origin are less strongly affected by larger proportions of migrant-origin children in a class. The diversity of pupils in terms of origin has weaker effects overall, although the reading comprehension of children with a migration background is negatively related to ethnic diversity in Grade 8, the year in which decisions are made for the school type that can be attended in secondary education. This conforms to the study of Van Ewijk and Sleegers (2010a), who demonstrated that peer- group effects increase as pupils get older.

Also children of Dutch descent had slightly lower scores on reading comprehension if they were in a class with a larger number of different origin groups. So, instructional problems resulting from a larger number of origin groups in a class were more negatively affecting children of Dutch descent. The combined results suggest that for reading comprehension in Grade 8 native-origin pupils are significantly influenced by instructional mechanisms and migrant-origin pupils by a combination of instructional and peer-group mechanisms.

The difference between math and reading comprehension for the effect of the number of origin groups for native-origin pupils in Grade 8 could possibly be caused by the different instructional needs of the pupils with respect to math and reading comprehension. For instance, for reading comprehension native-origin pupils possibly need more instruction that connects to their own needs as native-origin students. The results suggest that teachers have more problems with also planning the instruction for the needs of the native-origin pupils. Nevertheless, for math the teachers could possibly instruct more origin groups at the same time.

Our findings of ethnic diversity residuals in Grade 8 are partially in line with the earlier research of Dronkers and Van der Velden (2013). Using data from diverse OECD countries, Dronkers and Van der Velden found significant negative effects of ethnic diversity on reading scores for migrant-origin children in secondary schools. Nevertheless, in contrast to this earlier study we found in our research model no significant effects for mathematics. This difference could possibly be caused by the difference between primary and secondary education and the use of more countries in the analysis of Dronkers and Van der Velden.

Furthermore, the research design is different because we used (methodologically preferred) residualized scores on diversity. In our view, such a solution to the multicollinearity problem should be addressed in future research.

A previous study, using older Dutch primary school data (Primair onderwijs en speciaal onderwijs cohortonderzoeken, PRIMA), showed positive effects in higher grades of ethnic diversity on math scores (Maestri 2011a). This study used another research design with grade means. Nevertheless, the recent COOL data could give a clarification of the differences in the earlier findings of the effect of ethnic diversity. A possible clarification for this finding can be that the dataset of the earlier study included a more restricted collection of origin groups in the classrooms. Although both in the PRIMA and COOL data the origin countries are classified in 15 categories, in the PRIMA data some origin countries are old European migration countries like Spain, Italy, Greece, and Portugal, and in the COOL data these origin categories are replaced by new migration countries like Iraq, Afghanistan, Somalia, and a new European migration country: Poland. Therefore, a stronger ethnic diversity in the older PRIMA data relates to different, mostly European and Mediterranean, migrant-origin children in the classroom. In this recent study, however, a stronger ethnic diversity relates to pupils from highly diverse new migrant countries. Therefore, we could expect that due to the composition of the cultural distances with a higher ethnic diversity in the COOL data, this diversity could lead to more problems in ethnic identification and interethnic conflicts than in the PRIMA ethnic diversity index. Consequently, future research could take into account the difference in the influence of the cultural distances in the ethnic diversity index between diverse ethnic groups.

It must be noted that, with the cross-sectional data that we (and others) have used, claims about causal effects of class composition on pupils' performance should be made with caution. In particular, given the free school choice policy in the Netherlands, it is possible that native-origin families are more concerned about the ethnic composition of schools than migrant families. If better performing native-origin pupils are more likely to avoid schools with large concentrations of migrant-origin children, for example, because their better-educated parents are better-informed or more concerned, it is possible that our observed negative relationship between the proportion of migrant-origin children' and native-origin students' reading comprehension is flawed by this school selection process.

Although this study offers an expansion on the earlier models that measure the ethnic composition, future research can enrich these findings by using forthcoming cohort data from COOL, secondary school data, data from other countries, separate analyses for different origin groups, and an analysis for other non-cognitive school outcomes like active citizenship.

Chapter 3

Ethnic composition and school performance in the secondary education of Turkish migrant-origin students in seven countries and 19 European educational systems

Abstract

This chapter examines the effect of the ethnic composition on school performances in secondary education for Turkish students, using both cross-national and Swiss national PISA 2009 data. At school level our results show no effect of the proportion of native-origin students or the proportion of co-ethnics and a negative association between ethnic diversity (we employ a residualized score of diversity on the proportion of migrant-origin students) and math performances. Consequently, we find no evidence for social capital advantages and an indication of barriers. Finally, we find no association between social capital variables on national or educational system level and math performance.

3.1 Introduction

The relationship between ethnic school composition and school performance has been a topic of debate in the migration literature over the past decades (Karsten et al. 2006; Orfield and Lee 2007) and has also been recently investigated in both the American and European contexts (Van Ewijk and Sleegers 2010b; Agirdag, Van Houtte and Van Avermaet 2012). Beside ethnic share, recent studies also use ethnic diversity as an additional indicator of ethnic school composition (Van Houtte and Stevens 2009; Maestri 2011b; Braster and Dronkers 2013; Dronkers and van der Velden 2013; Veerman, Van de Werfhorst and Dronkers 2013). Other studies also use the share of co-ethnics (Halpern and Nazroo 2000; Fleischmann et al. 2012). A school's ethnic share refers to the proportion of migrant-origin children in the school (independent of ethnic group), whereas the share of co-ethnics refers to the proportion of children from a particular ethnic group. Ethnic diversity refers to the school's composition in terms of the number and size of different ethnic groups.

Researchers propose both social capital advantages and negative barrier mechanisms to explain the relationship between ethnic school composition and school performance. Migrant-origin students can share resources with their co-ethnic group (Crul and Doomernik 2003) due to stronger ties (Lin 2001) and acquire resources through contacts outside their ethnic group (Esser 2004; Cheng, Martin and Werum 2007). However, an ethnic school composition with more co-ethnics and fewer contacts outside one's ethnic peer group can also lead to barriers due to less access to social structures where bridging social capital can be acquired (Crosnoe, Cavanagh, and Elder 2003; Esser 2004; Cheng, Martin and Werum 2007).[1]

Although earlier studies reveal the effect of ethnic composition on both migrant-origin and native-origin students, they do not measure the relationships between the proportion of co-ethnics, the share of native-origin students, and ethnic diversity in schools and school performance across multiple societies and various educational systems. This paper uses both the cross-national PISA 2009 and the Swiss PISA (PISA.ch 2009) to investigate whether the ethnic composition of schools is associated with the educational performance of Turkish migrant-origin students at secondary schools in different European educational systems. This study focuses on Turkish migrant-origin students, as the Turks are the largest immigrant group in Europe and have settled in a large number of European countries (Crul and Vermeulen 2003). As a result, we were able to measure the proportion of migrant-origin students at both the school and national or educational system levels, using cross-national data. Furthermore, Turkish migrant-origin students are particularly interesting because earlier studies have shown strong ties to Turkish migrant-origin networks at both the

[1] For instance, students may acquire less information about the educational system due to fewer contacts outside their ethnic peer group. The availability of information is correlated with success expectations and less information leads to a lower desire to invest in capital in the destination country (Esser 2004).

country and school levels (Fennema and Tillie 1999; Van der Veen and Meijnen 2001; van Heelsum 2005). Moreover, Crul and Vermeulen (2003) note that the Turkish community in the Netherlands has more social capital than the Moroccan community in the Netherlands. Consequently, the influence of ethnic composition may differ between origin groups.[2] Our main research question is how ethnic composition is associated with the school performance of Turkish students in different European countries or educational systems.

This study aims to contribute to the literature in three ways. First, this study distinguishes the native-origin share, ethnic diversity, and share of co- ethnics using seven countries and 19 European educational destination systems.[3] Consequently, this study determines whether ethnic composition effects for specific groups in single countries are also present in cross-educational system data. Second, we argue whether social capital advantages or barriers can explain part of the relation between ethnic school composition and school performance. Although there has been considerable research using social capital focusing on the triangular ties between parents, teachers, and children in the U.S., our research is relevant because less is known about the influence of peer-group and interethnic ties as a resource for school performance in Europe (Cheng, Martin and Werum 2007). We investigate the influence of possible interethnic ties at the national level, as well as at the school level.

The Turks comprise the largest migrant group in Europe.[4] Therefore, it is interesting to determine whether differences in their relative community size across countries also lead to greater social capital advances for this relatively large ethnic group. Finally, this research shows whether different characteristics of destination countries or educational systems and migration paths of Turkish origin into Europe – and consequently differences in opportunities to acquire social capital – influence the educational performance of students of Turkish origin. Therefore, we first employ 2009 cross-national PISA data for an analysis at the national level and thereafter a combination of both 2009 cross-national PISA and 2009 Swiss PISA data for an

[2] In addition to these theoretical arguments, we also find empirical evidence that underpins the need to separately analyse Turkish migrant-origin students. Analysis shows significant differences between Turkish students and other migrant-origin students in both the proportion of native-origin students and residualized ethnic diversity. Turkish-origin students benefit significantly less from a higher proportion of native-born and are significantly more disadvantaged by higher levels of residualized ethnic diversity in their math performance. The results are available on request.

[3] Our analysis contains seven destination countries but 19 educational systems. Belgium, Germany, and Switzerland have more than one educational system at the subnational level.
Unfortunately, Germany's PISA data for our types of analyses were available only at the national level (Prokic-Breuer and Dronkers 2012).

[4] Different migration flows of Turkish residents to Europe occurred in the last century (Içduygu 2009). During the 1960s, a big wave of migration from Turkey to Europe took place, mainly because of the need for cheap labour workers in different European countries. This migration then waned in 1974 due to economic stagnation in Europe. Nevertheless, the population of Turkish migrants grew after 1974 due to family reunions, irregular labour migration, and marriage migration (Içduygu 2009).

analysis at the educational system level. A recent study on federal states in Switzerland shows differences in integration policies between educational systems within a destination country (Manatschal and Stadelmann-Steffen 2013), which is why our study of migrant-origin students distinguishes between the destination country and the educational system.

3.2 Theory

Social Capital

Since the 1990s, an increasing number of researchers have explained differences in educational performance using the concept of social capital (Dika and Singh 2002), frequently referring to the work of Bourdieu (1984), Coleman (1988), or Putnam (2000). Although Bourdieu, Coleman, and Putnam all refer to the importance of different resources within social networks, Bourdieu focuses more on reproduction through social capital. Coleman, in particular, considers social capital access to institutional resources (Dika and Singh 2002). For instance, the author argues that social capital, especially in the adult community surrounding the school, influences the high school dropout rate. While Coleman primarily focuses on family structure and parent–child interaction as variables representing access to resources, others focus on the network of individual families within the ethic community (Zhou 1997a) and the students' networks as a means of accessing resources (Stanton-Salazar and Dornbusch 1995; Morgan and Sørensen 1999). Bankston and Zhou (2002) note that ethnicity may even be considered a basis for systems that produce social capital. Finally, Putnam (2000) refers particularly to civic associations, with social capital generated inside homogeneous groups (bonding) as well as outside them (bridging). The author's analytical distinction between bonding and bridging capital reveals the possible importance of student ties both outside and within peer groups

Bonding Social Capital

We expect more bonding social capital in (relatively) larger groups of co-ethnics following the assumption of Blau's (1974) opportunity theory. Bonding capital may explain part of the advantages both inside and outside the school for migrant-origin students from a larger migrant-origin group because, according to the idea of bonding, there is greater opportunity for sharing resources between students or parents from a peer group of the same origin due to the stronger ties between individuals within the group (Lin 2001). Furthermore, "social closure increases learning among elementary and middle school students through the creation of a norm-enforcing environment that compels diligence" (Morgan 2000, 294). Several studies find evidence supporting the bonding theory for Turkish students. For instance, Van der Veen and Meijnen (2001) find that successful secondary education Turkish students in the Netherlands have a better relationship with their peer group than less successful Turkish students.

Furthermore, Peetsma et al. (2006) find that a higher proportion of migrant-origin students in a classroom is positively associated with math scores for Turkish and Moroccan pupils in the Netherlands. A higher proportion of migrant-origin students may also lead to better educational resources for migrant-origin students. Teachers in schools with a high number of migrant-origin students have more expertise to adapt their teaching to the specific needs of migrant-origin students (Peetsma et al. 2006). Therefore, this specialization argument may, in terms of social capital, lead to better bridging links to the teachers. However, a higher proportion of migrant-origin students in a school does not necessarily lead to an increase in the number of contacts within a student's ethnic peer group. For instance, schools with a high proportion of migrant-origin students may have high numbers of other ethnic groups and consequently small ethnic peer groups (Veerman, Van de Werfhorst and Dronkers 2013). Consequently, only the proportion of co-ethnics gives a valid indication of the relative possible number of ties within an ethnic peer group.

Bonding social capital is also captured at higher levels. Countries differ in the size of their Turkish immigrant communities. According to Turkish statistics, the Turkish Employment Service sent nearly 800,000 workers to Europe between 1960 and 1974: 649,000 to West Germany, 56,000 to France, 37,000 to Austria, and 25,000 to the Netherlands (Içduygu 2009).[5] Levels, Dronkers and Kraaykamp (2008) analyse different origin countries and show that the proportion of immigrant communities within destination countries is positively associated with the math performance of migrant-origin students. This association may also hold for our single Turkish migrant-origin group. Consequently, Turkish migrant-origin students might have bonding advantages due to the higher probability of having contacts with ethnic peers in the destination country.

Bridging Social Capital

Migrant-origin students can acquire bridging social capital throughout their contacts with native-origin students. We expect migrant-origin students to have more opportunities to acquire bridging capital in schools with (relatively) larger groups of native-origin students, again following Blau's (1974) opportunity theory.

[5] Besides labour migrant-origin persons, the statistics also include political refugees from Turkey to European countries, which include ethnic groups other than Turks. For example, some labour workers from Turkey are Kurds and Armenians. However, most available statistics refer only to a Turkish origin and not to Turkish ethnicity. For instance, we could only trace whether students of Turkish origin spoke Kurdish in three of the seven countries with the PISA data on students of Turkish origin. According to Hutchinson and Smith (1996), language is one of the six main features of ethnicity. Consequently, Kurdish-speaking Turkish students may define themselves as ethnic Kurds. However, we could not differentiate Kur- dish ethnicity in our cross-national and educational system analyses because this information was not available for all destination countries. Furthermore, Veerman and Weitenberg (2008) find that Kurdish-speaking people do not necessarily define themselves as Kurds. For instance, some Kurdish-speaking migrant-origin persons in the Netherlands define themselves as Armenian.

Bridging capital is a resource for "getting ahead" (Putnam 2000) or for expanding one's horizons (Morgan 2000). For instance, pupils' language development may be facilitated by a higher number of contacts with native-origin peers due to greater contact with pupils speaking the host national language as their mother tongue (Driessen 2002). Consequently, a higher share of native-origin students is associated with better school performance. In addition, migrant-origin students can acquire bridging social capital through contacts with other immigrant groups. Therefore, ethnic diversity can enrich students through communication, as when information about the culture of one ethnic group is relevant to the other group (Lazear 1998).

Bridging social capital can also be obtained at higher levels. For instance, migrant-origin groups can acquire formal advantages through labour agreements that stimulate opportunities for bridging. These agreements specify the general conditions of recruitment, employment, and wages. Turkey signed its first labour agreement with Germany in 1961. The United Kingdom also signed a labour agreement in 1961, but this agreement was less comprehensive. Later Austria, Belgium, France, the Netherlands, and Sweden followed with agreements in the mid-1960s. Switzerland and Denmark signed less comprehensive agreements during the 1970s. Finally, Norway signed an agreement in 1981 (Franz 1994). Esser (2004) especially mentions economic opportunities and the duration of stay as incentives to invest in destination country capital. An early comprehensive agreement implies more economic opportunities for Turkish migrants and a longer duration of stay for the Turkish community. Consequently, early comprehensive agreements facilitate the possibility of acquiring bridging social capital by reducing the risks of investing in destination country capital and lengthening the time to acquire this bridging social capital.

Barriers

While bridging and bonding capital may provide advantages, ethnic group contacts may also function as a barrier. For instance, ethnic contacts may also lead to more social control (Zhou 1997a). Strong social control could lead to Turkish migrant-origin students having a more ambivalent view of schooling (Crul and Doomernik 2003). Furthermore, high proportions of migrant-origin students may negatively relate to educational outcomes due to reduced access to social structures through which social bridging capital can be acquired (Crosnoe, Cavanagh and Elder 2003; Esser 2004; Cheng, Martin and Werum 2007).

The number of other ethnic groups and their size (ethnic diversity) may also have a negative influence on school performance. First, from a teaching perspective, a higher number of ethnic groups lead to cultural teaching problems concerning instructional time for larger numbers of ethnic groups (Maestri 2011a; Dronkers and Van der Velden 2013). Moreover, teachers need to adapt their teaching style to the cultural needs of diverse sets of pupils (Van Ewijk and Sleegers 2010b). Second, from the peer-group perspective, the existence of small ethnic groups may also lead to lower school achievement due to a mechanism that reduces ethnic identification (O'Reilly, Williams and Barsade 1997). Larger numbers of interethnic contacts may lead to greater interethnic tensions (Esser 2004), which can negatively influence academic performance (Hoxby 2000). Whereas Dronkers and van der Velden (2013) and Veerman, Van de Werfhorst and Dronkers (2013) find that ethnic diversity leads to lower school performance for migrant-origin students, Braster and Dronkers (2013) and Maestri (2011b) demonstrate a positive relationship between ethnic diversity and school performance in the Netherlands (for an explanation of the differences, see Maestri 2011b; Braster and Dronkers 2013; Veerman, Van de Werfhorst and Dronkers 2013). Consequently, ethnic composition may lead not only to social capital advantages, but also to barriers that reduce the school performance of migrant-origin students.

Hypotheses

Students of Turkish origin may benefit from bonding social capital within their own ethnic group and from bridging social capital outside their ethnic group. According to social capital theory, stronger relationships with one's own ethnic group lead to the sharing and exchange of resources. We expect a higher chance of co-ethnic contacts and access to positive ethnic social capital in a school with a higher proportion of Turkish students. Furthermore, both parents and students have a greater chance of acquiring bonding capital outside the school in a country with a higher proportion of co-ethnics. This leads to the following *co-ethnic hypothesis*:

There is a positive association between the proportion of co-ethnics both in the school and in the educational/national system and the math scores of Turkish migrant-origin students.

Aside from the school level, ethnic groups may also acquire social capital at the national level through their migration history. For instance, bilateral labour agreements between destination countries and origin countries represent a portion of the social capital of the origin groups, because a relatively comprehensive agreement provides incentives to invest in the cost of educating children in the destination country due to relatively stronger job security. Furthermore, a relatively early bilateral agreement indicates a longer time for the ethnic group to acquire capital in the destination country. Consequently, we expect the following *labour agreement hypothesis*:

There is a positive association between early comprehensive labour agreements and the math scores of Turkish migrant-origin students.

We propose native-origin students as one of the possible social bridging resources in the success network of migrant-origin students. We expect a higher chance of bridging contacts in a school with a higher proportion of native-origin students. We expect that this bridging mechanism dominates the specialization mechanism. This leads to the following *bridging social capital hypothesis*:

The proportion of native-origin students in the school is positively associated with the math scores of Turkish migrant-origin students.

Aside from the bridging capital between Turkish students and native-origin students, the former might benefit from bridging contacts with other ethnic groups. A greater ethnic diversity index is related to relatively more interethnic contacts (Veerman, Van de Werfhorst and Dronkers 2013). Consequently, greater ethnic diversity is associated with more diverse bridging social capital. Greater ethnic diversity can enrich students through communication, for instance, if information about one ethnic group's culture is relevant to another group. The information that other origin groups may supply is probably irrelevant to the math performance of the Turkish migrant-origin students in most cases. Moreover, if the information is relevant to another group, its use is only structurally implemented in some of the curricula (Svalberg 2007). Furthermore, increased interethnic contacts may lead to a greater risk of interethnic tensions due to the higher chance of cultural differences. These tensions (Esser 2004) negatively influence school performance (Hoxby 2000). Moreover, greater ethnic diversity may lead to teaching problems concerning instructional time for greater numbers of ethnic groups. Consequently, we expect the barrier mechanisms of ethnic diversity to have a dominant influence on school performance levels, as in the ethnic diversity hypothesis:

Greater ethnic diversity is negatively associated with the school performance of Turkish migrant-origin students.

3.3 Data and Variables

Data

We carried out analyses of the 2009 cross-national PISA and 2009 Swiss PISA Plus survey datasets. The cross-national PISA data contain information on the socioeconomic backgrounds and school achievement test scores of 15-year-old students of Turkish origin for all European countries with large Turkish communities, except for France, because the PISA in France contains no indicator for country of origin. Therefore, our analyses contain data for students of Turkish origin from Austria, Germany, and the Netherlands. Aside from these countries with large Turkish communities, information about students of Turkish origin is available for Belgium, Denmark, Liechtenstein, and Switzerland. Consequently, our dataset contains data for Turkish-origin students in seven European countries. In addition to the national level, the cross-national PISA data allow for a split between the Flemish and Walloon regions for the Belgian dataset. This is because the Belgian educational system is largely organized at the regional level. Due to the language difference between the Walloon and Flemish regions, we split our analysis for Belgium in two. Additionally, Switzerland's educational system is largely organized at the canton level. We could only separate Swiss students at the canton level if we employed the Swiss PISA Plus data. Unlike the cross-national PISA, the Swiss PISA Plus selects ninth-grade students, which is the grade in which most 15-year-old students are expected. Consequently, only students who were 15 years old during the test period were selected from the Swiss PISA Plus data, as for the cross-national data, to ensure comparable datasets.

Our combination of PISA and Swiss PISA Plus data comprises 19 educational destination systems for Turkish students.[6] We are interested in the ethnic school composition of the Turkish students. Consequently, our dependent variable is the math performance of 733 Turkish students in 19 European educational destination systems. However, for the calculation of the independent variables, we also use information on non-Turkish students. If only the cross-national data are used, our analyses contain 1,461 Turkish students in seven destination countries. We first show the outcome of our analyses regarding this dataset, which includes only seven educational destination countries. Following this, we present the analyses of the 19 educational systems. Consequently, we can show whether the design with a combination of PISA and Swiss PISA Plus influences our results.

Our study compares two research designs at our third level: a design with national-level variables and a design with educational system-level variables. Our design with national-level variables only covers seven countries, and our model with educational system variables covers 19 educational systems. Maas and Hox (2005) mention that the regression coefficients remain unbiased even if the sample size is as small as 10 groups of five units. Nevertheless, the authors find the standard errors of the regression errors are smaller when the number of cases at a higher level is considerably lower than 100: For instance, the standard errors decrease by approximately 15 percent when 30 groups are used instead of 100. A design with 10 groups leads to unacceptably underestimated standard errors at the group level (Maas and Hox 2005). Furthermore, a low number of cases at a higher level also lead to overestimating the group-level variance. Therefore, we expect that associations have lower standard errors for a design in which the third level is a national level compared to a design with the educational system at the third level.

[6] Because we also want to show descriptive statistics, we only selected cantons that had at least six Turkish students in the database. Consequently, we dropped three cantons and 1 percent of our students.

Variables

Dependent Variables

The dependent variable in this study is math performance. We focus on math performance because, generally, math scores are more strongly related to school class influences than language scores are (Creemers 2007), as math is more clearly learned at school than in other contexts, such as at home (Scheerens and Bosker 1997). To measure all academic skills accurately would make the PISA test too long to administer. Hence, PISA created a large number of shorter but very similar tests. Because such different tests can never be of exactly the same degree of difficulty, item response modeling (IRM) is used to obtain comparable results between students who took different tests. We average the five plausible values obtained from the IRM and compute the standard error of this average test score to take into account their variance (Dronkers and Van der Velden 2013). The skills scores were standardized for OECD countries using an average of 500 and a standard deviation of 100. The mean scores of students with a Turkish background are given in Table 3.1 by country, along with the differences between their mean test scores and those of native-origin students.

Individual Level

Origin. Using the method applied by Levels and Dronkers (2008), we use the country of birth of the child, father, and mother as the indicator for origin. If two of these three indicators are the same country and not the country of the test, we consider that country the country of origin. However, when all three indicators are different, the country of birth of the mother is used to represent the origin country.

Parental ESCS. The economic, cultural, and social status (ESCS) index of the parents is a composite index created within the PISA dataset of parents' occupational status, measured with the International Socio- Economic Index of occupational status (ISEI) scale (Ganzeboom, De Graaf and Treiman 1992), the educational level of the parents measured according to the International Standard Classification of Education (ISCED) and the presence of any material or cultural resources at the students' homes.

Table 3.1: Means and standard deviations for Turkish-origin students

	Total		Austria		Belgium		Denmark	
	mean	SD	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Indiv. level								
Math perf.	435.9	83.1	419.4	74.4	434.1	86.7	415.5	80.3
Read.perf.	417.8	85.7	383.3	79.8			411.2	75.4
High. track	0.8	0.4	0.5	0.5	0.6	0.5	1.0	0.0
ESCS	-0.8	0.9	-0.9	0.8	-0.8	1.1	-0.9	0.9
Female	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.5
First gene.	0.1	0.3	0.2	0.4	0.1	0.4	0.0	0.2
Grade	2.5	0.7	1.9	0.8	-0.8	0.7	2.8	0.4
Parents mixed mar.	0.1	0.4	0.1	0.3	0.3	0.4	0.1	0.3
Other lang. at home	0.5	0.5	0.6	0.5	0.6	0.5	0.4	0.5
Lang. at home mis.	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.4
School level								
% Nativeorigin stud*	45.7	25.4	50.2	25.6			36.3	25.0
Resid. ethnic div.	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2
Mean ESCS	-0.3	0.5	-0.3	0.5	-0.4	0.5	-0.3	0.4
Prop. of Turk. ori.*	21.8	21.2	23.7	21.5	19.8	14.3	34.3	30.1
Country level								
% of Turk. origin*	1.3	0.6	1.3	0.0	0.4	0.0	1.0	0.0
Av. math score nat. stud.*	526.0	16.0	510.6	0.0	538.6	0.0	508.4	0.0
Early bil. labor agr.	0.6	0.5	1.0	0.0	1.0	0.0	0.0	0.0
Diff. Turk.Nat. mean Math	-90.1	10.2	-91.2	0.0	-104.4	0.0	-92.9	0.0
Test level								
Error math	809.1	660.1	807.0	611.9	735.1	535.8	932.1	728.0
Error Read	526.7	437.7	629.4	539.3	512.8	428.2	464.9	368.4
N students	1,461		297		167		349	
N schools	594		119		65		110	

Table 3.1: (Continued)

	Germany		Liechtenstein		Netherlands		Switzerland	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Indiv. level								
Math perf.	439.3	82.2	498.3	76.6	470.6	73.4	457.3	89.0
Read.perf.	426.7	87.7	438.2	80.3	459.4	79.2	430.8	88.5
High. track	1.0	0.0	1.0	0.0	0.2	0.4	1.0	0.1
ESCS	-0.7	0.9	-0.8	0.8	-0.7	1.0	-0.8	0.9
Female	0.5	0.5	0.3	0.5	0.6	0.5	0.5	0.5
First gene.	0.1	0.3	0.6	0.5	0.1	0.3	0.2	0.4
Grade	2.9	0.7	2.8	0.4	2.3	0.5	2.7	0.6
Parents mixed mar.	0.2	0.4	0.1	0.2	0.1	0.3	0.2	0.4
Other lang. at home	0.5	0.5	0.9	0.3	0.5	0.5	0.5	0.5
Lang. at home mis.	0.2	0.4	0.1	0.2	0.2	0.4	0.2	0.4
School level								
% native-origin stud*	53.5	22.5	28.0	5.2	51.5	31.6	45.5	17.7
Resid. ethnic div.	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1
Mean ESCS	-0.2	0.5	-0.2	0.3	-0.2	0.6	-0.1	0.3
Prop. of Turk. ori.*	19.5	12.9	11.8	6.2	16.1	10.7	8.2	4.9
Country level								
% of Turk. origin*	2.0	0.0	2.3	0.0	2.3	0.0	0.9	0.0
Av. math score nat. stud.*	528.6	0.0	531.3	0.0	542.1	0.0	550.0	0.0
Early bil. labor agr.	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
Diff. Turk. Nat. mean Math	-89.3	0.0	-33.0	0.0	-71.5	0.0	-92.7	0.0
Test level								
Error math	692.2	523.6	359.2	145.1	583.0	408.1	1009.2	877.3
Error Read	496.4	391.9	312.3	174.8	489.2	328.1	575.7	496.3
N students	248		17		164		219	
N schools	99		6		72		123	

NOTE. - ESCS, economic, cultural, and social status.
*Grand mean centred in analyse

Higher Track. A higher track refers to track levels 2A and 3A of the ISCED, programs that ultimately lead to tertiary education (OECD 2012).

Female. We employ a dichotomous variable to classify gender. Males comprise the reference group.

First Generation. Using information on the countries of birth of the students and their parents, we construct a dichotomous variable. We define first-generation migrant-origin students as students who were born in Turkey, just as at least one of their parents. We define second-generation migrant-origin students as students who were born in the destination country with at least one parent who was born in Turkey.

Grade. As not all students in our sample attend the same grade, we include a variable to account for this. Due to between-country variance in the way grades are constructed, we standardize grades around the modal grade in a country.

Parents' Mixed Marriage. Using information on parents' country of birth, we construct a dichotomous variable. We define mixed-marriage parents as those where one partner was born abroad and the other was native born.

Other Language at Home Than the Destination Language. Using information regarding students' home language, we construct a dichotomous variable. As we lack data on the language at home of 5 percent of the students, we include the dummy language at home missing.

School Level

Proportion of Native-origin students. We compute the proportion of native-origin students using the percentage of native-origin students in the school.

Proportion of Turkish-Origin Students. The proportion of students of Turkish origin is computed using the percentage of students of Turkish origin in the school.

Ethnic diversity Residual. We compute an inverted Herfindahl index using the number of students per origin in every school. We calculated the index as follows: 1 - ((proportion ethnic group 1)2 + (proportion ethnic group 2)2 + … + (proportion ethnic group n)2). Although earlier studies show that both the proportion of migrant-origin students in a school and ethnic diversity are concepts that should be distinguished both theoretically and empirically, Veerman, Van de Werfhorst, and Dronkers (2013) shows in an empirical model that the use of both variables may lead to problems of multicollinearity due to the strong Pearson correlation between the proportion of migrant-origin students and ethnic diversity. Using the method applied by Veerman, Van de Werfhorst, and Dronkers (2013), we first estimate a quadratic regression model at the school level, predicting diversity to be a function of the proportion of migrant-origin students. Thereafter, we consider the residuals of this regression model, which are the differences between the diversity of origin observed in a school relative to the predicted diversity. Consequently, a positive ethnic diversity residual refers to a more ethnically diverse school than expected, given its proportion of migrant-origin children (see Appendix A). Furthermore, our residualized diversity indicator is independent of the proportion of migrant-origin students, as independence from the residual with independent variables is an assumption of ordinary least squares regression (Veerman, Van de Werfhorst and Dronkers 2013).

Mean ESCS. The mean ESCS is calculated using the ESCS scores of all students in the school.

Educational System Level

Average Math Score of the native-origin Pupils. The average math score of native-origin pupils is computed using only the math scores of native-origin pupils in the educational system.

Proportion of Migrant-origin students of Turkish Origin in the Educational System. We compute the proportion of Turks in the educational system using statistics from Eurostat and the Turkish Ministry of Labour and Social Security (2010). These statistics are confirmed by the German Federal Statistical Office (Krings 2010) and are comparable to the 2008 statistics of Statistics Netherlands (2012) and the Federal Statistical Office (2010) of Switzerland.

Early Bilateral Labour Recruitment Agreement. We distinguish five educational systems with an early comprehensive bilateral labour recruitment agreement and use 12 educational systems in the Swiss Confederation cantons, Denmark, and Liechtenstein as reference group.[7]

Selection Effect by Design (Due to the Use of Both the Swiss PISA Plus and the Cross-National PISA). We compute the selection effect using the proportion of Turkish students omitted due to our selection criteria that made the Swiss Pisa Plus and cross-national PISA data comparable.

Descriptive Statistics

Table 3.1 reports the means and standard deviations for Turkish students and the difference between their mean math scores and those of native-origin pupils by destination country. As Table 3.1 shows, Turkish migrant-origin students perform, on average, higher than 470 points in their math test in Liechtenstein and the Netherlands, while their math performance is lower than the average in Austria, Denmark, and Belgium. Furthermore, the largest Turkish-origin native-origin differences are found for Belgium and the lowest difference for Liechtenstein. Appendix E shows

[7] Instead of our bilateral labour agreement variable, other studies use indicators such as the MIPEX). Although the MIPEX measures the integration policy at the country level, Manatschal (2011) finds subnational variation in integration policies for Swiss cantons and differences in their effects on school performance (Manatschal and Stadelmann-Steffen 2013). Therefore, we prefer our bilateral labour agreement indicator, because all bilateral labour agreements were signed at the national level and not the subnational level. Furthermore, the bilateral labour indicator refers to our research sample and not to migrants in general.

that the total mean math score is 18.6 points higher when we only consider the selection of Turkish migrant-origin students instead of the cross-national PISA data. Consequently, our selection of 15-year-old Turkish migrant-origin students in the year in which most 15-year-old students occur leads to a selection of students with higher school performance. Students with lower test scores who were omitted due to the selection criteria probably repeated the school year. Appendix E shows a selection effect of 60 percent or higher for Walloon and Flemish Belgium, the Netherlands, and the Swiss canton Aargau. The mean results of these educational systems may have a positive influence in the selection effect.[8] Furthermore, the relatively low number of cases and relatively high standard deviation of the Swiss canton Vaud show that we should be cautious about concluding that Turkish students in Vaud perform better than in other educational systems.

3.4 Models and results

Analytical Design

Given the nested structure of the data, with individual pupils nested in schools that are nested in educational systems, we employ a multilevel analysis. At the lowest level, we include the standard error of the average of the five plausible math test values as an error term for the dependent variable.[9]

We employ restricted maximum likelihood instead of full maximum likelihood due to the small number of educational systems (Maas and Hox 2005). We check the robustness of our results in Section 'Results at the Educational System Level' and compare the results of only our cross- national data in Table 3.2 with selected data from the combination of Swiss PISA and cross-national data in Table 3.3. Because we employ a selection procedure for our combination of Swiss PISA and cross-national data, we add the variable selection design effect to all models in Table 3.3. Furthermore, in case of significant effects at the third level, we correct for underestimated expected standard errors (Maas and Hox 2005) due to the small number of cases at the national or educational system level.[10] Finally, we compare only our cross-national results in Table 3.2 with a selection of only cross-national results using the same selection as the educational system data. Although we employ several procedures to measure possible measurement errors, we emphasize that, due to the low number of countries, conclusions about variables at the national level

[8] Table 3.3 shows a significant positive selection effect in all models (except Model 7). These results confirm our expectation that the selection of 15-year-old Turkish students in the year in which most 15-year-old students are found leads to a selection of Turkish students with higher math scores.

[9] This procedure results in a measurement model at the next level of pupils (Hox 2002), which results in a more reliable estimation of the true score for the dependent variable.

[10] Due to the fact that the combination of Swiss PISA Plus and cross-national data covers only one grade, we remove from all models in Table 3.3 the grade variable that measures the influence of possible differences from expected grades.

should be made with caution.[11]

Our first model in Table 3.2 contains all the explaining variables at the individual level and the proportion of native-born and ethnic diversity at the school level.[12] In Model 2, we add the indicator for bonding capital, that is, the proportion of co-ethnics.[13] Finally, our third model also contains our national or educational system variables, except for the proportion of co-ethnics.[14]

Results at the National Level

Bonding Social Capital. Model 2 in Table 3.2 shows non-significant parameter estimates of 38.6 for the proportion of Turkish migrant-origin students at the school level. In addition, we use the proportion of Turkish students at the national level for our co-ethnics hypothesis. For Model 3 of Table 3.2, we find a non-significant association between the proportion of Turkish students at the educational system level and math performance. Therefore, we reject the co-ethnics hypothesis as a whole due to the non-significant parameter estimates of the proportion of Turkish migrant-origin students at both the school and national levels.

Bridging Social Capital. Our study employs two indicators of bridging social capital: the proportion of native-origin students in the school and the bilateral labour agreement. All models in Table 3.2 show non-significant parameter estimates between -7.9 and 8.2 for the proportion of native-origin students in the school. We therefore reject the bridging social capital hypothesis. Model 3 in Table 3.2 shows a non-significant parameter estimate of 16.2 for the bilateral labour agreement. Consequently, we also reject our bilateral labour agreement hypothesis.

[11] We also checked the robustness of our results at the school level for the first model of our cross-national analysis, using country fixed effects. Our check shows results that are comparable at the school level. The results are available on request.

[12] For our analysis of the educational system data, we added an indicator for the selection effect and dummies for Belgium and Switzerland to control for structural differences between the national and educational system levels.

[13] 13We checked Model 2 with only the proportion of Turkish students instead of both the proportion of native students and the proportion of Turkish students because these proportions are strongly correlated (r = -0.64). We found comparable results and a significant parameter estimate for the ethnic diversity residual. The results are available on request.

[14] We added the mean ESCS of the Turkish students in each country and educational system to check for differences in the ESCS composition of different Turkish communities. The results are comparable to those of our other models. We prefer our models without this control variable due to our restricted degrees of freedom at the country and educational system levels. Furthermore, we checked our final model considering only early comprehensive labour agreements or the proportion of co-ethnics at the country or educational system level (controlling for the selection effect and country dummies in the case of the educational system model). Although the results show mainly comparable associations, we find the proportion of co-ethnics to have a significant effect at the educational system level due to the lack of the mean math scores of native-origin students. The results are available on request.

Table 3.2: Regression of the school ethnic compositions on math scores of Turkish migrant-origin students in cross-national PISA data

	Model 1	Model 2	Model 3
Constant	455.5**	456.6**	432.0**
	(17.6)	(17.6)	(28.7)
Individual level			
ESCS	3.5	3.4	3.4
	(1.9)	(1.9)	(1.9)
Higher track	65.9**	65.7**	66.6**
	(6.5)	(6.5)	(6.5)
Female	-26.0 **	-26.0**	-26.0**
	(3.2)	(3.2)	(3.2)
First generation	1.0	1.2	0.9
	(5.0)	(5.0)	(5.0)
Grade	41.6**	42.0**	41.7**
	(2.8)	(2.9)	(2.8)
Parents mixed	12.8**	12.8**	12.8**
marriage	(4.8)	(4.8)	(4.8)
Other language	-6.1	-5.9	-6.1
at home	(3.9)	(3.9)	(3.9)
language at	-27.0**	-27.1**	-27.0**
home missing	(4.7)	(4.7)	(4.7)
School level			
proportion native-origin stud.	-7.9	8.2	-8.1
of school	(12.1)	(16.8)	(12.1)
Residuals ethnic	-103.8**	-62.7	-104.6**
diversity school	(26.9)	(40.1)	(26.9)
Proportion		38.6	
Turkish Origin school		(27.9)	
Mean ESCS of	55.6**	58.5**	55.5**
school	(6.2)	(6.6)	(6.2)
National level			
Proportion of			1.1
Turkish origin			(1.2)
Average math			28.7
score native			(36.0)
students			
Early bilateral			16.2
labor agreement			(25.6)
Variance			
National level	1768.0	1763.8	2089.6
	(978.5)	(976.8)	(1144.1)
School level	1122.8	1124.2**	1121.0**
	(158.6)	(158.7)	(158.5)
Individual level	2763.0	2762.3**	2764.4**
	(158.6)	(158.5)	(158.6)
Test level	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)
Log likelihood	16224.6	16222.7	16222.8

SOURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets. N countries 7, N schools 594, N students 1,461.
**p < 0.01; *p < 0.05.

Table 3.3: Regression of the school ethnic compositions on math scores of Turkish migrant-origin students in cross-educational system PISA data

	Model 1	Model 2	Model 3
Constant	445.1**	445.2**	449.3**
	(16.6)	(16.6)	(15.9)
Individual level			
ESCS	5.2	5.4	5.1
	(2.9)	(2.9)	(2.9)
Higher track	60.1**	59.6**	57.4**
	(11.9)	(11.9)	(11.6)
Female	-24.1**	-23.9**	-24.1**
	(4.8)	(4.8)	(4.8)
First generation	-0.9	-1.1	2.2
	(8.9)	(8.9)	(8.8)
Parents mixed marriage	15.2*	14.9	14.0
	(7.8)	(7.8)	(7.8)
Other language at home	-1.8	-2.0	-2.1
	(5.7)	(5.7)	(5.7)
language at home missing	-35.4**	-35.6**	-36.6**
	(6.9)	(6.9)	(6.8)
School level			
proportion native-origin stud. of school	-2.9	-8.2	-8.8
	(15.8)	(18.4)	(15.6)
Residuals ethnic diversity school	-99.2**	-122.4*	-92.1**
	(34.7)	(53.2)	(34.9)
Proportion Turkish Origin school		-21.5	
		(37.4)	
Mean ESCS of school	54.7**	53.5**	56.7**
	(8.9)	(9.2)	(8.7)
Educational system level			
Selection effect	1.3**	1.3**	0.8
	(0.4)	(0.4)	(0.5)
Belgium	-6.3	-5.6	-31.6
	(25.2)	(25.3)	(34.0)
Switzerland	0.7	-1.2	-37.9
	(16.0)	(16.2)	(20.3)
Proportion of Turkish origin			636.0
			(1499.6)
Average math score native students			1.3**
			(0.4)
Early bilateral labor agreement			-2.3
			(23.4)
Variance			
Educational system level	627.6*	629.0*	78.8
	(303.7)	(303.7)	(81.1)
School level	1026.8**	1032.4**	1058.4**
	(243.7)	(244.6)	(244.3)
Individual level	2939.6**	2954.6**	2918.6**
	(262.6)	(263.4)	(261.4)
Test level	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)
Log likelihood	8201.1	8201.7	8182.7

OURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets. N educational systems 19, N schools 386, N students 733.
**p < 0.01; *p < 0.05.

Barriers. Model 1 in Table 3.2 shows a significant association of -103.8 between residualized ethnic diversity and math scores. All the other models, except for Model 2, are also significant and negative.[15] Given these significant results, we can confirm the ethnic diversity hypothesis with regard to the math test scores of the Turkish migrant-origin students. Furthermore, Appendix F shows that we can also confirm the ethnic diversity hypothesis for reading scores.

Results at the Educational System Level

Associations at the School Level. Most results at the school level in Table 3.3 are comparable to the results in Table 3.2. Consequently, we also reject both the co-ethnics and bridging social capital hypotheses at the school level and confirm the ethnic diversity hypothesis. Model 2 of Table 3.3 shows inverted results for the proportion of student of Turkish origin in the school. However, these results are non-significant.

Associations at the Educational System Level. Model 3 of Table 3.3 shows no significant association between the proportion of Turkish students at the educational system level and math performance. We therefore reject the bonding social capital hypothesis at the educational system level as well. Furthermore, our bilateral labour agreement variable is also non-significant in Table 3.3. Therefore, we also reject the bilateral labour agreement hypothesis, using the educational system design.

We expect comparable associations at the highest[16] level for Turkish students in Europe in a design that uses a national or educational system level, with higher standard errors for the educational system design at the highest level. Our results show different associations at the highest level. For instance, Model 3 in Table 3.2 shows an association of 33.1 between an early bilateral labour agreement and math performance, while Model 3 in Table 3.3 shows an association of 7.8. Furthermore, Model 3 in Table 3.2 also shows a higher standard error for an early bilateral labour agreement than in Table 3.3. At the end of the next section, we evaluate whether these unexpected differences are due to selection in our design.

Robustness Check

We check the robustness of our results by re-estimating the coefficients of Model 3 of Table 3.2 by excluding one of the seven destination countries from every analysis. We then show the results of the single countries that lead to non-robust results. The robustness checks in Appendix G show significant associations between

[15] Ethnic diversity involves the proportions of the different ethnic groups. The reduction of the ethnic diversity parameter may be explained by this overlap and additional analyses show that the ethnic diversity residuals explain this model's non-significant parameter estimate of the proportion of Turkish students in the school. The results are available on request.

[16] We call the country or educational system level the highest level to make the text more readable.

ESCS and math scores at the individual level if we exclude Austria, Germany, or the Netherlands. The robustness check in Appendix G shows that most results at the school level are comparable, except for the model that excludes Denmark. Table G1 shows that, if we exclude Denmark, the negative parameter of residualized ethnic diversity in math performance becomes non-significant. If we compare the results of Denmark in Table G2a in Appendix G with the cross-national results in Table 3.2, the association between residualized ethnic diversity math scores in Denmark is higher. Furthermore, the robustness check for only our cross-national data shows that the significant association of -104.6 for math scores grows to -124.9 if we exclude the Netherlands. Comparison of the results of the Netherlands in Table G2 in Appendix G with the cross-national results in Table 3.2 reveals an inverted significant positive association of 189.2 between residualized ethnic diversity and math test scores for the Netherlands. The association between reading test scores and residualized ethnic diversity is also positive and significant. Finally, Appendix G shows that all variables at the national level become significant if we exclude Germany. We reject our hypotheses at the national level due to the higher standard errors that occur due to Germany. Nevertheless, a robustness check of our educational system data shows no significant association between any of the educational system- level variables if we exclude Germany.[17]

Model 3 in Table 3.3 shows a significant association of 1.3 between the mean math test scores of native-origin students and those of the Turkish migrant-origin students at the highest level. Although Maas and Hox (2005) expect a decrease of approximately 15 percent when 30 groups are used instead of 100 groups, the association between the mean math test scores of native-origin students and those of the Turkish students remains significant, even at $p < 0.01$, if we increase the standard error by 32 percent. The results at the individual and school levels in Table 3.2 are comparable to the results for only cross-educational system analyses in Table 3.3. Consequently, the selection of only 15-year-old students in the year in which we expect most such students hardly influences our results at the individual and school levels. Our control variables probably intercept the selection effect. Nevertheless, Table 3.2 shows no significant variables at the national level. This difference is contrary to the expectations of Maas and Hox (2005). Appendix H shows a table with our selection of the cross-national data. Model 7 in Appendix H reveals no significant association between the average math score of native-origin students at the national level and the math scores of Turkish migrant-origin students. This result suggests that the significant association in Table 3.3 regarding the educational system level is not due to the selection of Turkish migrant-origin students who are in the grade in which we expect the greatest number of 15-year-old students to be.

[17] The results are available on request.

3.5 Conclusion and discussion

We investigate the association between various indicators of the ethnic composition of schools and Turkish migrant-origin students' test scores at secondary schools, using both European cross-national and cross-educational system data. In this study, we further distinguish between the proportion of native-origin students and the proportion of co-ethnics. We challenge the theoretical notion of social capital advantages from bonding inside the ethnic peer group or through bridges outside the ethnic peer group to barriers that lead to less social capital explaining part of the association between the ethnic composition of schools, countries, or educational systems and school performance. Our results show no bridging advantage in schools with more native-origin students for our sample of Turkish students in Europe. Greater opportunities for bridging contacts with native-origin students do not automatically lead to the exchange of resources (Putnam 2000) to aid students to perform well in school.

Our results demonstrate no significant relationship between the proportion of co-ethnics and math scores at the school level if we control for ethnic diversity residuals. This finding suggests that greater opportunity for bonding contacts at the school level for the Turkish migrant-origin students does not necessarily lead to a positive influence on math performance. This result may be explained by the lower efficiency of the ethnic group's social capital (Esser 2004). However, a recent study shows active participation in religious organizations in the U.S. and Canadian contexts provides access to tangible resources but creates no advantages for the second generation in Western Europe (Connor and Koenig 2013). Consequently, the lack of effect of bonding social capital may also be explained by the European context of the study.

Children of Turkish descent do not display significantly higher school performance when in an educational system with a larger community of co-ethnics. Unfortunately, data distinguishing between the national and educational system levels for Germany were not accessible for our research (Prokic-Breuer and Dronkers 2012). Therefore, we could only use the educational system level when analysing a selection of 15-year-old students in the year in which most 15-year-old students are expected to be in their country and consider Germany one educational system. Our robustness check shows significant associations between all our national-level variables if we exclude Germany. These significant results occur mainly due to the lower standard errors. Consequently, these results combined with the very large variations in average educational outcomes between German educational systems (Köller, Knigge and Tesch 2010; Prokic-Breuer and Dronkers 2012) indicate possible differences in the relationships within Germany. These differences may be partly explained by differences between educational systems in Germany that cannot be modeled due to data restrictions of the German government. However, an extra robustness check shows no significant results when we exclude Germany from our educational system model. Consequently, these different findings combined with the different findings between our national and educational system models show the importance of the attribution of the educational level besides the national level and a supply of data without restrictions.

We demonstrate significant negative relationships between residualized ethnic diversity and math performance. Dronkers and Van der Velden find a negative association between non-residualized ethnic diversity and the school performance of migrant-origin students, using 2006 PISA data. These findings regarding a single migrant-origin group are therefore comparable with the earlier cross-national findings of Dronkers and van der Velden (2013) for the whole migrant-origin group. These analyses of our ethnic diversity indicator reveal evidence of ethnic barriers and no arguments for bridging social capital advantages at the school level.

Our robustness checks for Denmark and the Netherlands show clearly inverted results regarding the influence of ethnic diversity. The data from Denmark show strong negative associations of ethnic diversity and school performance, while data from the Netherlands reveal positive relations between ethnic diversity and test scores. The difference in results regarding ethnic diversity between Denmark and the Netherlands may partly be explained by the long history of both Islamic and non-Islamic Dutch relations from the colonies. The positive association may be influenced by a combination of different histories in policies and appreciations of ethnic diversity. For instance, students in secondary education in the Netherlands can choose immigrant languages as a subject in their formal teaching program, unlike the situation in Denmark (Nusche, Wurzburg and Naughton 2010). Therefore, we underline that, despite similarities in the functioning of European educational systems, there are also national differences between European countries and their ethnic composition effects.

Our results reveal no significant influence of early comprehensive bilateral labour agreements on the math performance of Turkish migrant-origin students. We therefore reject the notion of greater social capital generated by early labour agreements. A positive influence of an early comprehensive bilateral labour agreement follows the idea of national control of migration. The non-significant finding might be in line with the idea of Castles (2002: 1147), who states that "control strategies based on an older national logic are likely to fail" due to globalization. Furthermore, the expected positive time component in the early comprehensive bilateral labour agreements may be neutralized by the contextual influences of Turkish migrant-origin students inside the educational systems (Zhou 1997b). For instance, labour market prospects and urban subcultures can also differ within educational systems. Finally, the lack of a time influence may partly confirm the idea that the integration of Turkish migrant-origin persons – in the sense of a decline and ultimately disappearance of inequality between native-origin persons and migrant-origin persons (Connor and Koenig 2013) – "no longer seems to be simply a matter of time" (Esser 2004, 1126).

Claims about the causal effects of school composition on the school performance of Turkish migrant-origin students should be made with caution, as we (and others) used cross-sectional data. It is possible that Turkish families with higher-performing children are more concerned about the ethnic composition of schools than Turkish families with lower-performing children. If better-performing Turkish pupils are more likely to go to schools with large concentrations of native-origin children or schools that are less ethnically diverse – possibly as a result of their better-educated parents being more informed or more concerned about this issue or living in neighbourhoods with a greater numbers of native-origin neighbours – it is possible that our observation of the relationship between ethnic composition and school performance is flawed as a result to this school selection process. We can, however, partly reject this selection process notion, as including positively selected Turkish migrant-origin students yields findings at the school level comparable to those for the entirely Turkish migrant-origin group.

The PISA data have their limitations for cross-national comparisons. For instance, it is impossible to differentiate between regions of origin in Turkey from the PISA data. Therefore, a difference in educational outcomes between different countries may be influenced by Turks from a certain region selecting a certain destination country.

Future research can enrich these findings by focusing on other migrant-origin groups. Alternatively, data outside the European context as well as cohort study data could be used. Other viable options would be to analyse other non-cognitive school outcomes such as active citizenship.

Chapter 4

The relationship between ethnic diversity and classroom disruption in the context of integration policies

This chapter studies the relationship between ethnic school composition and classroom disruption in secondary education in the context of integration policies. We measured classroom disruption using students' reports from 3533 schools in 20 countries provided by cross-national PISA 2009 data. We employ the migrant-origin share and the ethnic diversity net of the native-origin share as indicators of the ethnic composition of a school. The MIPEX is used as an indicator of integration policies. Our results show a positive association between ethnic school diversity net of the migrant-origin share and classroom disruption. Furthermore, we show a negative interaction term of the integration policy and ethnic diversity. Consequently, our results indicate that students in countries with a more inclusive integration policy are at least less harmed by influence of ethnic school diversity regarding classroom disruption. Findings partly support the "contact hypothesis" and reject the "threat hypothesis" in an educational context.

4.1 Introduction

One of the founders of sociology, Emile Durkheim, considered school discipline as an important research field, and argued that school discipline is a key to the process of youth socialisation and an instrument for moral education (Durkheim 2002 [1961]). More recently, sociologists also recognise school discipline as potentially playing a "critical role in children's and adolescents" internalisation of conventional social expectations and norms' (Arum, Ford and Velez 2012, 2). Moreover, a better disciplinary climate associates with higher cognitive school performances (Arum, Ford and Velez 2012).

Recent studies on school discipline measure the economic and ethnic homogeneity of school networks (Arum, Ford and Velez 2012; Van de Werfhorst, Bergstra and Veenstra 2012). Although these recent studies on school behaviour use "the share of migrant-origin students" or "ethnic diversity" (Stefanek et al. 2012) in a school or class as an indicator of homogeneity, these studies lack to separate the influence of the share of children with a migration background and the diversity among this group of children. Ethnic share refers to the proportion of migrant-origin children in a class (independent of which specific ethnic group children are identified with), whereas ethnic diversity refers to the composition in the class in terms of the number and size of different ethnic groups. Although a higher proportion of migrant-origin students might refer to a higher ethnic heterogeneity of a school, a high proportion of migrant-origin students might also refer to a lower ethnic homogeneity due to a strong concentration of one specific migrant-origin group in a school. Therefore, the proportion of migrant-origin students and the ethnic diversity isolates different processes concerning diversity (Veerman, Van de Werfhorst and Dronkers 2013). A few recent studies on student achievement have distinguished the share and diversity (Braster and Dronkers 2013; Dronkers and van der Velden 2013; Maestri 2011b; Van Houtte and Stevens 2009; Veerman, Van de Werfhorst and Dronkers 2013), although primarily predicting student achievement or other student-level outcomes. We investigate whether diversity is related to classroom disorder. A lack of school discipline may emerge in schools with high diversity, but might differ between destination countries. We study this using PISA 2009 data from 20 different countries for which data are available on the origin countries of the parents of the students.

This study, therefore, aims to contribute to the literature in three ways. First, we measured classroom disruption using the students' reports instead of the reports from school staff. Second, we distinguished both the proportion of migrant-origin students and ethnic diversity in our model using two distinct conceptualizations of ethnic school composition. Finally, we distinguished how differences in integration policies across countries might influence the association between the ethnic composition and school climate.

4.2 Theory and hypotheses

Ethnic diversity and school climate

Why does ethnic diversity of schools relate to school climate? Ethnic diversity refers to ethnic composition in school in terms of the number and size of different ethnic groups and consequently, to the relative number of possible interethnic contacts (Veerman, Van de Werfhorst and Dronkers 2013). A number of recent studies show a negative association between ethnic diversity and school performance for immigrant students in secondary education in a large number of European destination countries (Dronkers and Van der Velden, 2013; Veerman and Dronkers 2016). A part of this negative relation is explained by pointing to mechanisms of problems of adapting the teaching to the different needs of students (Veerman, Van de Werfhorst and Dronkers 2013) or of problems of understanding the instruction (Maestri 2011b) due to fewer incentives to adapt to the culture of the destination country. Furthermore, as Esser (2004) argues, increased interethnic contact may lead to increased interethnic tension. These tensions may negatively influence academic performance (Hoxby 2000). Moreover, these interethnic tensions might lead to more disordered incidents.

Although cross-country studies find a significant relation between ethnic diversity and student performance, studies in specific contexts show no significant or even positive relations between ethnic diversity and school performances. These positive relations are explained by the idea of enrichment due to more cultures in a class (Lazear 1998; Maestri 2011b), the urban context (Braster and Dronkers 2013) or the country context (Veerman and Dronkers 2016).

Recent studies on school discipline use both economic variation and proportion of ethnic students to explain differences between school climates (Arum, Ford and Velez 2012). These researchers have found a higher proportion of (children of) immigrants to be related to disciplinary problems. Single-country studies, however, show no significant results (Arum and Velez 2012). Furthermore, a qualitative study in the English context indicates no relationship between the share of migrant-origin students and classroom disruption (Lupton 2005). Although Arum, Ford and Velez (2012) show that while disruption and victimisation are negatively related to school performance, these indicators asked directly to the teacher can measure only one impression of disruptive behaviour. However, the classroom disruption concept might refer to a combination of different student behaviours. For instance, classroom disruption might refer to whether or not students can work and whether or not they listen to instructions during the lessons alongside classroom disorder. Especially, in the more common cases, where there is no classroom disorder all the time, a combination of disorder and work behaviour covers a range of student disruptive behaviour throughout the entire lesson.

Although the proportion of migrant-origin students strongly correlates to ethnic diversity, a school with a high proportion of migrant-origin students does not necessarily lead to more possible interethnic contacts (Veerman, Van de Werfhorst and Dronkers 2013). For instance, a school with 100% Turkish migrant-origin students is ethnically homogenous and consequently results in no interethnic contacts. Therefore, following the idea of more interethnic tensions due to more interethnic contacts, our classroom *disruption hypothesis* states that:

A higher ethnic diversity is associated to more classroom disruption.

Ethnic diversity and school climate in different contexts

Although we expect overall, a positive relationship between ethnic diversity and classroom disruption, recent studies show opposed relationships between ethnic diversity and school performances across countries (Veerman and Dronkers 2016) and different relationships between ethnic diversity and tolerance (Janmaat 2012) in different countries. Consequently, different contexts might influence the tensions between different ethnic groups. Positive attitudes about dealing with diversity are explained in the "contact hypothesis" of Allport (1954) and negative attitudes between ethnic groups by the "threat hypothesis" in recent debate about interethnic contacts (Gijsberts, Van der Meer and Dagevos 2012; Keating and Benton 2013; Putnam 2007). From the threat hypothesis perspective, it is argued that native-origin persons may feel threatened by migrant-origin persons in their position (Blalock 1957). The threat hypothesis, therefore, explains the possible ethnic tensions between natives and migrants due to natives' notions of possible domination by migrants in political or economic positions.

Allport (1954) stressed, from the contact perspective, the importance of conditions that must be fulfilled in the contacts. He mentioned "equal status within the situation" and "authority support" as two of the four conditions for optimal contact between different ethnic groups. Pettigrew and Tropp (2006) revealed in their meta-analysis the overall positive effect of intergroup contact on intergroup attitudes, but they found that Allport's conditions are not essential for positive outcomes. Janmaat (2012) and Pettigrew (1998) mentioned the possible influence of the society on the contacts of different ethnic groups. Pettigrew argued that the contacts and conditions between different ethnic groups are structured and formed by institutional and societal norms (Pettigrew 1998). Consequently, we expect from a "contact hypothesis" perspective that countries with more inclusive integration policies support with their authority the positive intergroup contacts on institutional levels. Furthermore, the rights that a country provides its immigrants, is an indication of the dominant norms regarding equality between ethnic groups in that country. The findings of Veerman and Dronkers (2016) seem to support this contact perspective on a country level, because they show for Turkish students a positive relationship between ethnic diversity and school performance in a country with a more inclusive integration policy and a opposed relationship in a country with a less inclusive integration policy. Janmaat (2012) revealed a positive relationship between ethnic diversity and tolerance in Sweden and Germany and no relation in England. Nevertheless, England is the country that is in the ranking of inclusive integration policies a country between Sweden and Germany (Koopmans, Michalowski and Waibel 2012). Moreover, a comparative study on immigrant educational attainment in Britain, Canada and the United States found comparable results between the destination countries (Rothon, Heath and Lessard-Phillips 2009). Consequently, these studies indicate no influence of the integration policy. However, a more recent study shows a smaller ethnic inequality in test scores in countries with more inclusive integration policies, using 10 destination countries (Van de Werfhorst, van Elsas and Heath 2014).

Besides these studies, in the context of education, other studies are more sceptical about the integration force of more inclusive integration policies. Three arguments are typically given in this critical literature. First, multiculturalism policies may lead to social and economic marginalisation (Koopmans 2010). Second, Duyvendak et al. (2013) argue that an aggregation of indicators cannot measure a coherent integration model. Finally, more rights for migrants might induce feelings of threat of the natives (Wagner et al. 2006). Overall, the literature shows mixed findings with a number of arguments for the "threat hypothesis" that might reduce but not necessarily eliminate the influence from the perspective of the "contact hypothesis" especially in the case if we compare a higher number of destination countries. Our *integration policy hypothesis* therefore states that:

A higher ethnic diversity results in a weaker association to classroom disruption in countries with a regime of more inclusive integration policy.

4.3 Data and variables

Data

The analyses have been carried out using the cross-national PISA 2009. The cross-national PISA contains both social economic background and classroom disruption information of 15-year-old students from a high number of countries (OECD 2012). Unfortunately, a number of countries – including the United States – that participated in PISA did not indicate the countries of origin. Because we measured the influence of ethnic diversity, information about more than three specific countries of origin countries is essential.[1] Consequently, we only focused on the European countries that have included the country of origin data in PISA and Australia and New Zealand.

[1] PISA data only contains information about the country of origin and – for some destination countries – the migrant's language. Consequently, we cannot refer to a broader concept of student ethnicity (Hutchinson and Smith 1996), but only to country of origin.

We split our analysis for Belgium in two sections as PISA allows the possibility of nationwide analysis alongside data selection for the Flemish region and the Walloon region.[2] Thus, our data-set contains information on 3729 schools in 20 destination countries. We omitted 4.2% of our schools due to student numbers lower than 8 per school. Moreover, 1.1% of these schools show no data regarding classroom disruption. Consequently we use the data of 3533 schools.

Variables

Dependent variables

The dependent variable in this study is the classroom disruption of the school. PISA 2009, contains five possible questions that could measure the classroom disruption with the following topics: “students don’t listen to teacher”, “the teacher has to wait a long time for quiet”, “students cannot work well”, “students don’t start working for a long time after the lesson begins” and “there is noise and disorder”. The questionnaire for students contains four possible answers: “never or hardly ever”, “some lessons”, “most lessons” or “all lessons”. If the classroom disruption variable forms no adequate scale in some countries, we should remove these countries from cross-country analysis (André, Dronkers and Fleischmann 2009) or possibly remove indicators. Categorical Principal Components Analysis (CATPCA) in both cross-national data and country data show factor loadings of 0.7[3] or more for all questions except for “the teacher has to wait for quiet”. The factor loading of “the teacher has to wait for quiet” is approximately 0.7 in most countries except for Greece where a 0.4 value is shown in the data. Consequently, we created a variable for classroom disruption for our cross-national analysis that contains all selected countries and possible questions from PISA except “wait for quiet”, using the listwise deletion setting of CATPCA. Although the answers of students refer to their experience and interpretation of the question, we refer to classroom disruption, in this paper, to make the text more readable.

School-level variables

Percentage of migrant-origin students. We computed the percentage of migrant-origin students using the number of migrant-origin students in schools.

Ethnic diversity residual. Using the number of students per country of origin involved in each school, we computed an inverted Herfindahl index of country of ethnic diversity. We calculated the index as follows: 1 – ((proportion ethnic group 1)² + (proportion ethnic group 2)² + … + (proportion ethnic group n)²). Although earlier studies showed that the proportion of migrant-origin students in a school and

[2] We split Belgium in two regions due to the language difference between the regions and due to the regionally organised educational system.

[3] Only Greece shows a factor loading of 0.6 for “long time to start”.

country of ethnic diversity are concepts that we should distinguish both theoretically and empirically, Veerman, Van de Werfhorst and Dronkers (2013) showed that in an empirical model the use of both variables may lead to problems of multicollinearity, due to the strong Pearson correlation between proportion of migrant-origin students and the country of ethnic diversity. Using the method applied by Veerman, Van de Werfhorst and Dronkers (2013), we estimated a quadratic regression model at school level, predicting diversity to be a function of the percentage of migrant-origin students controlled with dummies for the different destination countries. We then took the residuals of this regression model, thereby measuring the difference between ethnic diversity as is observed in a school relative to the predicted diversity (see Appendix C for a visualisation of the method). This measurement thus does establish the level of diversity, given a particular percentage of migrant-origin students. The residualized diversity indicator is independent of the percentage of migrant-origin students, because residuals are assumed independent of the X-variables in ordinary least squares regression.

The mean ESCS was calculated using the ESCS score of all students in school.

Variation in ESCS. We computed the coefficient of variation in ESCS by dividing the standard deviation in ESCS within the school by the school-level mean ESCS.

Percentage of females. We computed the percentage of females using the number of female students in the school.

Educational system level

We use the Gross Domestic Product (GDP) per capita 2009 based on purchasing power parity in constant 2005 international dollars from the World Bank (World Bank 2013). The GDP provides an indication of living standards across different countries. For Scotland, we calculated a GDP comparable to the World Bank using information concerning the difference in GDP between the United Kingdom and Scotland (McLaren, Armstrong and Gibb 2013). Regional GDP data for Belgium could have been included, but Walloon and Flemish students both live in the Brussels region.[4] This region shows the highest GDP in Belgium. It is for this reason that GDP data for Belgium was set at a national level.

[4] The Walloon data and the Flemish data contain both students from the Brussels region, because these students are assigned to a region based on the teaching language of their school.

The MIPEX is a composite index of policy areas that measures the integration policy of destination countries (Niessen, Huddleston and Citron 2007). The MIPEX II distinguishes six integration policy areas: labour market access, family reunion, long-term residence, political participation, access to nationality and anti-discrimination. The MIPEX is based on expert interviews and policy assessments, using 140 indicators. A high MIPEX refers to a more inclusive integration policy. We use the MIPEX index as an indication of whether the destination country has a more or less inclusive integration policy. We use the MIPEX II data that was collected in 2007 because this is the MIPEX data that was collected before, rather than after the PISA data collection took place. Unfortunately, information concerning Croatia was first collected after 2011 and was only available with the categories of recent MIPEX III from 2010. Although MIPEX II and MIPEX III are not completely comparable, we use the MIPEX III data for Serbia and Croatia in our analysis. We underpin that the MIPEX index of Croatia may show some bias due to changes over time and the composition of the index[5].

Descriptive statistics
Table 4.1 shows the mean values and standard deviations of our dependent variables per destination country.

The classroom disruption scores vary from –0.26 in Germany to 0.36 in Greece. These countries differ more than a standard deviation. Alongside Germany also Latvia scores a mean disruptive score under –0.20. Furthermore, Table 4.1 shows also for Luxembourg a classroom disruption above 0.20.

Tables 4.2a and 4.2b show that the difference in means and standard deviations is small between the cross-national data and the cross-national data MIPEX countries selected. Table 2b shows that the MIPEX values range from 30 to 78. Consequently, our data-set contains a wide range of the countries where MIPEX is measured, because our data contains the country with the lowest MIPEX score and the second highest MIPEX score (Niessen, Huddleston and Citron 2007).

[5] We checked our results using the MIPEX III or excluding Croatia and found comparable results. Results available on request.

Table 4.1: Descriptive statistics of classroom disruption by destination country

	N	Mean	SD
Australia	351	0.05	0.35
Austria	230	–0.04	0.45
Belgium (Flemish)	143	0.02	0.35
Belgium (Walloon)	107	–0.01	0.34
Czech Republic	236	0.13	0.52
Croatia	156	0.10	0.40
Denmark	276	–0.11	0.31
Finland	188	0.18	0.37
Germany	209	–0.26	0.33
Greece	159	0.36	0.33
Latvia	174	–0.29	0.33
Liechtenstein	12	–0.19	0.36
Luxembourg	38	0.25	0.30
Montenegro	47	–0.25	0.23
Netherlands	178	0.16	0.29
Norway	189	0.13	0.35
New Zealand	161	0.03	0.29
Portugal	206	–0.19	0.28
Scotland	97	–0.06	0.29
Switzerland	376	–0.10	0.34
Total	3533	–0.00	0.36

SOURCE. -PISA 2009. Own computation.

Table 4.2a. Descriptive statistics of variables in cross-national data

	Minimum	Maximum	Mean	SD
Classroom disruption	–1.02	1.77	–0.01	0.39
School level				
Proportion migrant-origin students*	0.00	100.00	25.46	21.01
Residuals ethnic diversity	–0.61	0.21	0.00	0.03
Mean ESCS	–1.80	1.61	0.11	0.48
Variation ESCS	0.04	0.28	0.13	0.030
Proportion of female*	0.00	100.00	50.00	17.62
N countries	20			
N school	3533			

SOURCE. -PISA 2009. Own computation
*Grand mean centred in analyses.

4.4 Models and results

Analytical design

We employed a multilevel model, in which schools are nested in countries. We estimated our models using Markov Chain Monte Carlo (MCMC) estimation techniques, because this approach is likely to reduce bias in comparison to Maximum Likelihood estimation in a model with 16 countries and cross-level interactions (Stegmueller 2013).

Because MCMC is a Bayesian estimation technique, we estimated the confidence (i.e., credibility intervals) that measure the uncertainty of the parameter estimates. The confidence interval indicates a 95% probability that the parameter estimate will lie between two values of the interval.

Our first Model 1a contains all explaining variables at school level and country level using classroom disruption as dependent variable. At school level, this first Model is largely comparable to the research model of Arum, Ford and Velez (2012). Our Model 1b contains only the 16 countries with MIPEX data available. We have added in our second Model, the GDP and MIPEX at country level, as Akiba et al. (2002) revealed an influence of GDP on victimisation. Finally, we have added the cross-level interaction term in our third Model. As a result, we could test our disruption hypothesis using Model one and we test our integration policy hypothesis with Model 3.

Table 4.2b: Descriptive statistics of variables in cross-national data MIPEX countries selected

Minimum	Minimum	Maximum	Mean	SD
Classroom disruption	–1.02	1.77	–.01	0.40
School level				
Proportion migrant-origin students*	0.00	100.00	23.75	20.95
Residuals ethnic diversity	–0.62	0.20	0.00	0.03
Mean ESCS	–1.80	1.61	0.09	0.49
Variation ESCS	0.04	0.28	0.13	0.03
Proportion of female*	0.00	100.00	49.9290	16.43
Country level				
GDP	12,902	67,915	31067.02	9463.64
MIPEX2007*	30	78	53.42	13.19
N countries	16			
N school	2962			

SOURCE: -PISA 2009. Own computation
*grand mean centred in analyses.

Although our dependent variables may seem to be observable, the student answers might be influenced by cross-national interpretation differences. Gerber (2012) mentions – for instance – that speaking out of turn, might be interpreted by the teacher as classroom disorder in Russia, while it might be interpreted otherwise in other countries. Furthermore, the answers might be influenced by cross-national (Van Herk, Poortinga and Verhallen 2004) and cross-cultural response styles (Fischer et al. 2009). In a supplement found in Appendix I, we checked for the possible influence of cross-national response styles using an additional model that contains dependent variables with grand mean-centred values on national level. Consequently, we removed all country influences and assumed in this model that all differences in scores across countries are not due to actual differences in classroom disruption, but due to differences in response styles. In Appendix J, we included a weighting factor on school level in all models to control for accuracy of measurement of the mean school disruption as reported by students. We calculated the weighting factor as follows: 1/school-level variance. Thereafter, we divided the individual weighting factor by the mean of our weighting factor to get a mean weighting factor of one. Consequently, we give schools with a lower variance (i.e. less heterogeneity of the students' judgments) a higher weighting factor. We use in our control for accuracy of measurement, a Maximum Likelihood estimation technique, because weighting factors are ignored in MCMC (Centre for Multilevel Modelling 2011).

Results

Table 4.3 model 1a and 1b show for ethnic diversity significant parameter estimates of 0.7 (95% CI: 0.3–1.0) and 0.8 (95% CI: 0.4–1.2). Consequently, we confirmed our classroom disruption hypothesis.

Using Model 3, we test our integration policy hypothesis which predicts that the association between classroom disruption and ethnic diversity is weaker in countries with more inclusive integration policies. Consequently, we expected a significant negative association between the cross-level interaction between the MIPEX data and ethnic diversity. The results for Model 3 in Table 4.3 confirmed the integration policy hypothesis.

Figure 4.1 shows that for a country with a higher MIPEX, the children are less harmed by influence of ethnic diversity regarding classroom disruption.

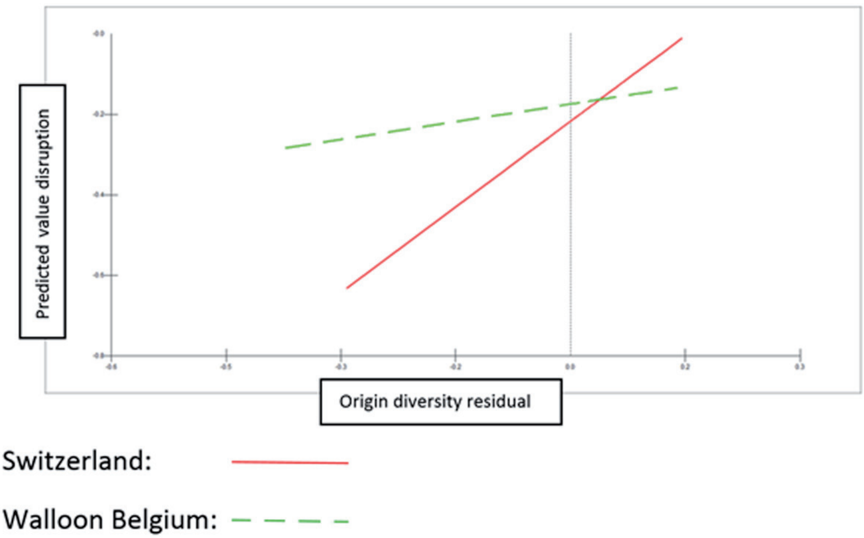
Appendix I shows results that are corrected for between-country variation using the grand mean-centred values of the disruption score. Results are comparable to our results in Table 4.3, of course the between-country variance disappears. Therefore, if all differences across countries are due to cross-national response styles, the findings still confirm both the classroom disorder hypothesis and the integration policy hypothesis.

Table 4.3: Bayesian results of the school ethnic compositions on classroom disruption in cross-national PISA data

	Model 1a			Model 1b			Model 2			Model 3		
	B	95% CI		B	95% CI		B	95% CI		B	95% CI	
Constant	–0.07	–0.18	0.04	–0.01	–0.12	0.10	–0.20	–0.58	0.19	–0.20	–0.56	0.12
School level												
Percentage migrant-origin of school	–0.01	–0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	–0.00	0.00
Residuals ethnic diversity of school	0.67*	0.33	1.01	0.82*	0.43	1.20	0.82*	0.44	1.20	0.81*	0.43	1.17
Mean ESCS	–0.13*	–0.16	–0.10	–0.09**	–0.12	–0.06	–0.09*	–0.13	–0.07	–0.09*	–0.12	–0.07
Variation ESCS	0.55*	0.03	1.06	0.45	–0.12	1.00	0.45	–0.11	1.00	0.46	–0.12	1.01
Percentage females of school	–0.00*	–0.00	–0.00	–0.00*	–0.01	–0.00	–0.00*	–0.01	–0.00	–0.00*	–0.01	–0.00
Educational system level												
GDP							0.00	–0.00	0.00	0.00	–0.00	0.00
MIPEX							0.00	–0.01	0.01	0.00	–0.01	0.01
MIPEX * Resid. Diversity										-0.04*	-0.08	-0.01
Variance												
Country level	0.04*	0.02	0.08	0.04*	0.02	0.09	0.04*	0.02	0.09	0.04*	0.02	0.09
School level	0.12*	0.11	0.12	0.12*	0.12	0.13	0.12*	0.12	0.13	0.12*	0.12	0.13
DIC	2.458.17			2.181.90			2.182.07			2.178.71		
N countries	20			16								
N schools	3533			2962								

SOURCE. -PISA 2009. Own computation.
*0 not in 95% CI.

Figure 4.1. Ethnic diversity (residualized) on classroom disruption in cross-national PISA data and the MIPEX scores of Walloon Belgium (66) and Switzerland (42) (based on Table 4.3, Model 3)



Finally, Appendix J shows results that are corrected for accuracy of measurement. Although our results of ethnic diversity are comparable to our results in Table 4.3, the significant negative association between the cross-level interaction between the MIPEX data and ethnic diversity becomes non-significant.

4.5 Conclusion and discussion

In this Chapter, we investigated the relation between the ethnic composition of schools, and school discipline at secondary schools using PISA 2009 data. School discipline is one of the indicators of the internalisation of conventional social expectations and norms.

Besides the influence of ethnic composition on non-cognitive school performance, we explored the country-level influence of integration policies on this relation. We underpinned the importance of both the conceptual and methodological differences between ethnic share and ethnic diversity. Furthermore, we developed an indicator that measures classroom disruption as mentioned by the students. Finally, we introduced the MIPEX index in our discussion concerning school discipline and country comparisons, as we expected integration policy differences across countries to explain a part of the differences in the association between ethnic school composition and school discipline across countries.

Our results demonstrated that ethnic diversity significantly associates with the classroom disruption. Consequently, students at schools with more possible interethnic contacts than we expect due to the proportion of migrant-origin students show increased classroom disruption. Our non-significant associations for share of migrant-origin students and classroom disruption are in line with the results by Arum and Velez (2012) and Lupton (2005) for individual countries regarding the share of migrant-origin students, but it also underpins the importance to control both for the share of migrant-origin students and ethnic diversity in a single research model.

Our results indicate differences across countries with different integration policies. Our data demonstrated that students in countries with a higher MIPEX showed a lower association between ethnic diversity and classroom disruption. Nevertheless, the association becomes non-significant when we control for the variability between schools in the accuracy of school variables based on student data. The significant results in this study suggest that the non-significant results regarding integration policies in the context of education in earlier studies are caused by the low number of destination countries included in these other studies, as both the studies conducted by Van de Werfhorst, van Elsas and Heath (2014) and the current study show significant results for integration policies that include multiple destination countries.

The results indicate that students in countries with a more inclusive integration policy are at least less harmed by influence of ethnic school diversity regarding classroom disruption. These findings partly support the "contact hypothesis" and reject the "threat hypothesis" in an educational context. Countries with more inclusive integration policies possibly support the positive intergroup contacts with their authority (Pettigrew 1998) at school level. Consequently, these results show that we should take into account, the institutional context when we refer to the influence of ethnic diversity, on classroom disruption. Although our research design is cross-sectional, the results indicate that changes in integration policies are not only possibly related to integration, but also exert influence on interactions between students on school level. Consequently, policymakers should be aware of this possibly perverse effect of more restrictive integration policies. Furthermore, teachers should be aware of political changes regarding integration as they could lead to increased tension in the classroom, which in turn could lead to increased classroom disruption.

Limitations and directions for future research

Our research design with a cross-country comparison has its limitations. For instance, Manatschal (2011) shows sub-national variation in integration policy for Swiss cantons. Although a research design that measures at sub-national level for all countries might be preferable, a model with sub-national information for all countries is impossible as sub-national information is not accessible for Germany (Prokic-Breuer and Dronkers 2012) in the current PISA data. Second, we recognise that nationality and culture may have influenced individual interpretation and experience of students regarding their perception of school climate and that this may not reflect actual behaviour in the classroom. However, an analysis that controlled for such national differences indicate comparable results. Third, because our students are all in secondary education, the results might differ for students in different age stages (Veerman, Van de Werfhorst and Dronkers 2013). Finally, claims about causal effects of school composition or country integration policy on students' school classroom disruption should be made with caution, due to the cross-sectional character of the data used. Cohort study data, sub-national data from future studies or studies with students in different age stages can enrich and develop the findings of this study.

4

Chapter 5

Why is ethnic composition related to school performance? The relevance of teaching, school organizations, and peer groups

Abstract

Most earlier research has focused only on the relationship between ethnic composition and school performance and not on the mechanisms behind this relationship. A differentiation in the conceptualisation of the ethnic composition between *share of native-origin students* and *ethnic diversity* has not often been done by previous research and provides opportunities to disentangle the different mechanisms that explain the relationship between the ethnic composition of schools and school performance in secondary education of migrant-origin students using cross-national European PISA 2009 data. Three mechanisms are distinguished: (1) *teaching mechanisms* (qualified teacher shortage), (2) *organization mechanisms* (materials shortage) and (3) *peer-group mechanisms* (classroom disruption). The results reveal a non-significant association between the proportion of native-origin students and reading performance of migrant-origin students. The relationship partly intensifies when a *teaching mechanism* (qualified teacher shortage) is included. Part of the negative impact of ethnic diversity on reading performance is explained by a combination of *organization mechanisms* (materials shortage) *and peer-group mechanisms* (classroom disorder). The partial explanation of the relationship between ethnic diversity and reading performance by classroom disorder provides support regarding intercultural tensions or to reduced feelings of belonging due to more potential interethnic contacts.

5.1 Introduction

Influencing the ethnic composition of schools is regarded as one of the possible remedies that policymakers can employ to provide disadvantaged students with more educational opportunities (New and Merry, 2014). A growing number of studies focus on ethnic composition and school performance, and these studies show positive, negative or no relationships between them (Braster and Dronkers, 2013; Dronkers and Van der Velden, 2013; Maestri, 2011b; Sykes and Kuyper, 2013; Van Ewijk and Sleegers, 2010b; Veerman and Dronkers, 2016; Veerman, Van de Werfhorst and Dronkers, 2013). The explanatory mechanisms behind the relationship between ethnic composition and school performance remain unclear because most earlier research only mentions possible mechanisms but, to our knowledge, do not empirically test these mechanisms (Thijs and Verkuyten 2014).

In the past decades, researchers have proposed several theoretically interrelated mechanisms (Sykes and Kuyper 2013) to explain the relationship between ethnic school composition and school performance: *peer-group mechanisms* (Crul and Doomernik 2003; Thijs and Verkuyten 2014; Veerman and Dronkers 2016), *teaching mechanisms* (Dronkers and Van der Velden 2013) and *organization and management mechanisms* (Lupton 2005). Native-origin peers in the classroom could share language resources to migrant-origin students (Driessen 2002). Researchers argue that same-ethnic peers may share more resources than non-same-ethnic peers (Crul and Doomernik 2003; Driessen 2002). Same-ethnic peers could lead to a higher sense of belonging and be supportive for higher school performances. Conversely, peer-group mechanisms may also lead to an ambivalent view of schooling (Crul and Doomernik 2003), to fewer incentives to adapt to the dominant culture (Maestri 2011b) or to tensions between different ethnic groups (Esser 2004). Consequently, teachers need to motivate these students, adapt their teaching style to the diversity in student needs (Dronkers and Van der Velden 2013; Lupton 2005) and deal with ethnic tensions. However, teachers and schools may specialize in catering to the needs of migrant-origin students (Peetsma et al. 2006).

To our knowledge, most earlier studies have only focused on the direct association between ethnic composition and school performance and not on explanatory mechanisms. Studies with a simultaneous focus on school performance and social outcomes of the ethnic school composition are uncommon (Thijs and Verkuyten 2014).

Most existing research has focused on the share of migrant-origin students or native-origin students and not on ethnic diversity. The share of migrant-origin students refers to the relative probability that a student has native-origin students in the school. On the other hand, the concept of ethnic diversity takes into account differences in origin countries, as well as the relative number of possible interethnic contacts (Veerman, Van de Werfhorst and Dronkers 2013). In particular, the distinction between the share of migrant-origin students and ethnic diversity provides an opportunity to disentangle some of the interrelated mechanisms because the association between ethnic diversity and school performance is an indication of the *peer-group mechanism*. Students in schools with a higher ethnic diversity need to cross more cultural barriers (Esser 2004). The tensions that occur due to these barriers and the opportunities to of enrichment due to different cultures in the school could be seen as a peer-group mechanism that explains the relation between ethnic diversity and school performance (Veerman and Dronkers 2016).

This study aims to contribute to the literature in two ways. First, we distinguish both the proportion of native-origin students and ethnic diversity in our model using a method to distinguish the two conceptualisations of ethnic school composition. Second, we test specific mechanisms and determine whether these mechanisms explain the associations between the ethnic composition and school performance. We study these issues using the PISA 2009 student assessment data collected from 15-year-old students in European countries. Applying multilevel analyses, we examine whether ethnic diversity and the share of native-origin students in a school are associated with student achievement (measured as reading performance). We analyse the relationship between ethnic composition and school performance separately for native-origin and migrant-origin students because earlier studies found different outcomes between migrant-origin students and native-origin students (Dronkers and Van der Velden 2013; Maestri 2011b; Peetsma et al. 2006). Furthermore, we only found stable significant associations between ethnic diversity and school performance for migrant-origin students[1] (Appendix K shows the results for the native-origin students and Appendix P shows the significance and standardized effect sizes for both native-origin and migrant-origin students). Therefore, we explored whether *teaching mechanisms* (measured by the perceived hindrance in schools due to a lack of qualified language teachers) and *organizational mechanisms* (measured by the perceived hindrance in schools due to shortages in instructional materials) explain the relationship between the share of native-origin students and achievement for *migrant-origin students*. Moreover, we explored whether *peer-group mechanisms* (measured by classroom disorder) explain the possible association between ethnic diversity and reading achievement for migrant-origin students.

[1] Although the relationship between ethnic composition and school performance differs for the native-origin students between the school subjects, Appendix P shows a significant positive relationship between the proportion of native-origin students and math performance for native-origin students.

5.2 Theoretical background

Ethnic composition of schools and school performance

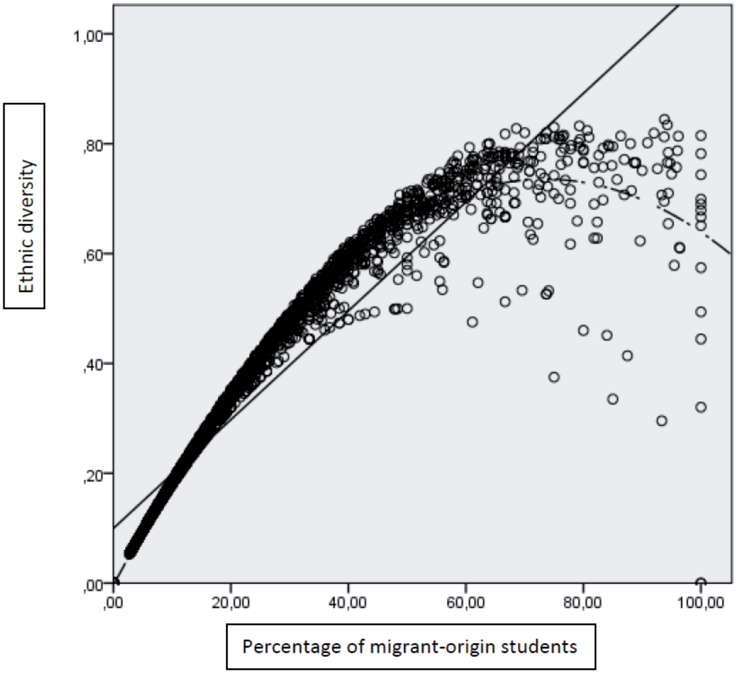
Before going into detail about the underlying mechanisms between ethnic school composition and school performance, it is important to clarify that a growing number of studies differentiate between two concepts of the ethnic composition of schools: i) *the share of native-origin students*[2] *(or migrant-origin students*; percentage of native-origin students within a school) and ii) *the ethnic diversity* (relative number of possible interethnic contacts between students in the school). These concepts refer to two different yet strongly correlated compositional aspects of schools (Janmaat 2012). Figure 5.1 indicates that a higher share of migrant-origin students often coincides with a higher number of possible interethnic contacts. However, it does not always follow that a higher share of migrant-origin students refers to a greater number of possible interethnic contacts (Veerman, Van de Werfhorst and Dronkers 2013). This becomes particularly apparent in schools with only migrant-origin students from a single ethnic group (high share of migrant-origin students) where there are no possibilities for interethnic contact (low ethnic diversity).

A greater share of migrant-origin students automatically leads to a lower proportion of native-origin students in the class. Consequently, a lower proportion of native-origin students is linked to a loss of bridging capital that migrant-origin students may acquire from native-origin students (Driessen 2002; Veerman and Dronkers 2016). Furthermore, classes with a higher share of migrant-origin students require teachers who are able to cater to the needs of migrant-origin students (Peetsma et al. 2006). The relationship between ethnic diversity and school performance is particularly explained through peer-group mechanisms[3]: different ethnic groups may enrich the classroom through differences in ideas and foreknowledge (Lazear, 1998; Maestri, 2011b). Moreover, it is argued that a higher ethnic diversity gives stronger incentives to orient or adapt to the dominant culture (Lazear 1999; Schachner et al. 2016). Consequently, migrant-origin students in classrooms with more ethnic diversity are more able to understand the teaching that is often dominated by the dominant culture (Maestri 2011b). Nevertheless, more possible interethnic contacts could also lead to more possible interethnic contacts could also lead to more tensions

[2] In the European studies where we refer to 'native-origin students', these are students with non-migrant backgrounds. Migrant-origin children thus include both first- and second-generation migrant-origin children. Migrant students are defined in most of the quantitative European studies as students with at least one parent that was born abroad (Levels and Dronkers, 2008).

[3] The origin country of the students is measured using information on origin country of the parents (Levels and Dronkers, 2008). Because origin country does not include the sense of belonging to an ethnic group (Hutchinson and Smith, 1996), the diversity measurement that refers to the country of origin and not to the sense of belonging to an ethnic group may underestimate peer-group effects because students that are defined as a migrant-origin student with a specific origin country may not ethnically define themselves as migrants from that origin country.

Figure 5.1: The percentage of migrant-origin students and ethnic diversity in PISA 2009



SOURCE. -PISA 2009, own computation.

between different groups because the students need to cross more possible ethnic barriers (Esser 2004; Veerman and Dronkers 2016). Therefore, the association between ethnic diversity and school performance may be especially influenced by student (mis)behaviour.

Share of native-origin students

Positive relationships between the native-origin share and school performance of migrant-origin students can be explained by peer-group mechanisms: an increase in opportunities (Blau 1974) to access (bridging) social capital (Coleman 1988; Putnam 2000) from native-origin students. For instance, speaking with native-origin pupils can facilitate language development in migrant-origin pupils (Driessen 2002). Recent studies show mixed findings regarding the relationship between the share of native-origin students and school performance. The relationship differs between native-origin students and migrant-origin students and between different migrant-origin groups (Van Ewijk and Sleegers 2010b). Although most studies point toward no or slightly positive relationships between share of native-origin students for migrant-descent students (Ewijk and Sleegers 2010b), a Dutch study in primary education revealed a negative relationship between the share of native-origin students and school performance for migrant-origin students (Peetsma et al. 2006). This negative relationship is explained by teaching mechanisms: the teachers in schools with a lower share of native-origin students specialize in catering for the needs of migrant-origin students (Peetsma et al. 2006), but could also be explained peer-group mechanisms. Majority of international migrants tend to come not from the poorest families (De Haas 2007). Positively-selectively migrant-origin students have higher level of advantage in school performance relative to the native-origin population (Van de Werfhorst, Van Elsas, and Heath 2004) and can facilitate school performances other students in the school.

Even though, according to peer-group mechanisms, a higher proportion of native-origin students may lead to higher school performance due to a greater opportunity to speak with native-origin students, the positive relationship can also partly be explained by teaching mechanisms. Firstly, teachers in schools with a lower share of native-origin students may have lower expectations regarding their students (Rosenthal and Jacobsen 1968). Moreover, it is argued that the economically better-situated students move out from schools with fewer resources to schools with more resources and more highly qualified teachers (Driessen 2002). And more highly qualified teachers move out from schools with fewer resources to better-situated schools (Lupton 2005). Therefore, less hindrance on learning due to a lack of qualified teachers in schools with a higher proportion of native-origin students could be expected. Research on the expectations of head teachers regarding the shortage of qualified teachers as a hindrance to students' learning shows that location and school size could not explain these expectations (White and Smith 2005). The expectations are negatively associated with migrant-origin students' school performance even when country differences are taken into account (Braster and Dronkers 2014). Consequently, the expected positive association (Ewijk and Sleegers 2010b) between the share of native-origin students and reading for migrant-origin students' performance due to the increase in opportunities for access to social capital might be overestimated when the research does not control for teaching mechanisms as measured by teacher shortages. Therefore, our *teaching hypothesis* states:

Teaching mechanisms partly explain the positive relationship between the share of native-origin students and reading performance.

In addition to the proposition that economically better-situated students may move to schools with more highly qualified teachers, it is argued that these students also choose schools with more resources (Driessen 2002). Nevertheless, Cebolla-Boado and Mediana (2010) show for Spanish primary schools that the association between the share of native-origin students and school performance increases when the number of computers in the school is controlled for, implying a negative relationship between share of native-origin students and school resources. However, a qualitative study in England shows that the staff of schools where most students speak a language other than English at home complained of a lack of appropriate books to teach literacy to students with low literacy performance (Lupton 2005). Consequently, the students in schools with a high proportion migrant-origin could especially suffer due to the organizational mechanism of educational instruction resources in addition to the teaching mechanisms. Therefore, our *educational resources hypothesis* states:

Educational resources partly explain the positive relationship between the share of native-origin students and reading performance.

Ethnic diversity

Negative relationships between ethnic diversity and school performance have been explained by *peer-group mechanisms* (Crul and Doomernik 2003; Thijs and Verkuyten 2014; Veerman and Dronkers 2016) and *teaching mechanisms* (Dronkers and Van der Velden 2013; Denessen, Driessen and Bakker 2010). The literature uses *organizational* mechanisms to explain the relationship between share of native-origin students and not to explain the relationship between ethnic diversity. Dronkers and Van der Velden (2013) argue that lower school performance can be explained by problems of teaching specific students. For instance, in a more ethnically diverse classroom, the teacher needs to adapt their teaching to a greater variety of migrant group needs. In particular, students of migrant descent may suffer from these problems of adaption, because the instructions of teachers are frequently oriented toward the dominant culture. Moreover, teacher attitudes toward diversity could explain the relationship between ethnic diversity and school performance (Denessen, Driessen and Bakker, 2011).

From a *peer-group mechanism* perspective, it is argued that different groups in more ethnically diverse classrooms need to cross more ethnic barriers (Esser 2004; Veerman and Dronkers 2016) as higher ethnic diversity leads to an increase in possible interethnic contacts (Blau 1974). Goldsmith (2004) shows that a higher ethnic diversity is associated with more interethnic friendships, but he also shows a relationship between ethnic diversity and increased interethnic conflict. Moreover, the proportion of in-school friends and co-ethnic friends decreases in more ethnic divers schools (Geven, Kalmijn and Van Tubergen 2016). Ethnic tension (Hoxby 2000) or feelings of belonging (Osterman 2000) may be mechanisms that influence learning. Ethnic tensions or reduced feelings of belonging to the school may become visible by a less favourable disciplinary climate.

Although the disciplinary climate is influenced by *peer-group mechanisms,* it must be noted that *organizational* and *teaching mechanisms* also influence the disciplinary climate because the three mechanisms are interrelated. Cross-national studies show no relationship between the share of native-origin students and classroom disorder (Arum and Velez, 2012) but show that children in more ethnically diverse schools (given the share of native-origin students) experience more classroom disorder (Veerman 2015). Moreover, the ethnic homogeneity of schools relates negatively to individual problem behaviour of students in schools (Geven, Kalmijn and Van Tubergen 2016). This negative relationship is explained by a mechanism of feelings of belonging (a higher proportion of in-school friends and co-ethnic friends) (Geven, Kalmijn and Van Tubergen 2016). Studies show that a less favourable disciplinary climate is associated with lower cognitive school performance (Arum and Velez 2012; Ning et al. 2015). As students in schools with a higher ethnic diversity suffer from more classroom disorder, the disciplinary climate might be an important behavioural mechanism that partly explains the negative relationship between ethnic diversity and school performance for migrant descent students. Our *disciplinary climate hypothesis* thus states:

The disciplinary climate partly explains the negative relationship between ethnic diversity and reading performance.

5.3 Data and operationalisation

Data

We test our three hypotheses with data from the cross-national PISA 2009. PISA is a cross-national representative survey with data from 15-year-old students on school performance, social economic background, school organization and classroom disruption (OECD 2012). The analysis of datasets with a single country or a small number of destination countries may influence results due to the selectivity of specific countries. Consequently, we prefer to use the cross-national data of PISA 2009, which contains different Western destination countries. We limit our analytic sample to destination countries that provide information on more than three specific countries of origin of the students, as this is essential information to measure ethnic diversity. Unfortunately, a number of countries – including the United States – that participated in PISA did not classify the countries of origin. Consequently, we only focus on European countries that include the country of origin data in PISA. We split our analysis for Belgium into two sections as PISA allows a nationwide analysis alongside the data for the Flemish region and the Walloon region. Consequently, our dataset includes the following destination countries: Austria, Belgium (Flemish), Belgium (Walloon), Croatia, Czech Republic, Denmark, Finland, Germany, Greece, Latvia, Liechtenstein Luxembourg, Montenegro, Netherlands, Norway, Portugal, Scotland and Switzerland.

Our results and an earlier cross-country study showed only a negative relationship between ethnic diversity and reading performance for migrant-origin students (Dronkers and Van der Velden 2013). Therefore, we only show the results of the mechanisms for the migrant-origin students as we are particularly interested in the mechanisms behind the relationship between ethnic composition and reading performance[4]. The total sample contains 92,270 students[5] in 18 destination countries. We omitted 5.1% of our total sample of students due to data on the country of origin[6], disruptive behaviour, teacher shortage and instructional materials being missing. Moreover, schools with a student count of eight or fewer were disregard, due to concerns about the reliability of characteristics of schools. Finally, 1.3% of the students show no data regarding the control variables. The analytic sample, therefore, consists of 21,333 migrant-origin students in 2708 schools in 18 destination countries.

Operationalisation

The dependent variable in this study is the *reading performance* of individual students. We prefer reading performance because the social capital of the native-origin students is expected to be especially important for language development. Moreover, the disruption indicator in PISA 2009 was measured for the reading lessons.

The reading performance score was developed by PISA. PISA created a large number of very similar but short tests to measure reading performance. Item Response Modelling (IRM) was used to achieve comparable results between students who took different tests. We computed our regressions for every plausible value and averaged the parameter estimates in order to take into account the variance between these five plausible values.

Ethnic composition variables

Our explanation variables are the proportion of native-origin students and residualized ethnic diversity.

Proportion of native-origin students. We calculated the proportion of native-origin students using the number of native-origin students in schools.

Ethnic diversity residuals. We calculated the ethnic diversity using the proportions of the different origin groups in the school. We calculated the ethnic diversity with an inverted Herfindahl index (range: 0 to 1). Because the share of migrant-origin students and ethnic diversity correlate in our dataset ($r = 0.92$), a research model that includes both indicators of the ethnic composition will lead to problems of multicollinearity. Therefore, we calculated ethnic diversity residuals to solve the problem of multicollinearity and

[4] We also check the results for math performance using the PISA 2012 data and found no significant relationship between ethnic diversity and classroom disruption for both migrant-origin and native-origin students. Results available on request.

[5] Including both native-origin and migrant-origin students.

[6] We calculated our school-level ethnic composition variables using the students from the whole sample that indicated their country of origin.

to keep the distinction between the share native-origin origin students and ethnic diversity. Ethnic diversity residuals are residuals of the ethnic diversity as a function of the percentage of immigrants. The residualized diversity indicator is independent of the percentage of migrant-origin students. Consequently, we have no problems of multicollinearity due to the strong Pearson correlation between the percentage of migrant-origin students and the ethnic diversity as residuals are assumed independently of the X-variables in an ordinary least squares (OLS) regression. Because these residuals measure the distance between ethnic diversity as observed in the school relative to the predicted diversity in the regression model, the residualized diversity demonstrates the level of diversity given a particular percentage of migrant-origin students. Appendix C and chapter 4.3 explain how the residualized ethnic diversity was calculated.

Control variables

At the individual level, we control for gender (1 = female), parental economic, cultural and social status (ESCS) (composite index from PISA regarding parents' occupational status, educational level and the presence of any materials or cultural resources in the students' homes), generation, non-vocational orientation, grade, single mother, ethnically mixed marriage and the use of the destination country language as the primary language. Appendix L describes the control variables in more detail.
At the school level, we control for the mean ESCS, the variation of ESCS, the proportion of females and the proportion of single parents. Consequently, our model is mainly comparable to the models of Arum and Velez (2012) and Dronkers and Van der Velden (2013)[7]. However, we differ from Dronkers and Van der Velden's model as we only use the proportion of native-origin students and not the proportions of different ethnic origin groups.

Explanatory variables

The explanatory variable for the teaching mechanisms is qualified teacher shortage. We use instructional materials shortage as an indicator of organizational mechanisms and classroom disruption of the school as an indicator of peer-group mechanisms.

Qualified teacher shortage is an index ranging between -1.41 and 2.87 regarding the extent to which there is a perceived hindrance in schools due to a lack of qualified language teachers. This index is based on answers given by school principals. Positive values refer to higher teacher shortages. The index has an average of 0
and a standard deviation of 1 for OECD countries. Answers from the teachers may be influenced by differing expectations across countries. We, therefore, use a country-mean-centred index.

[7] We control our models for over-specification by using models that only control for the ESCS and the mean ESCS. Results for the share of native-origin students and ethnic diversity residuals are comparable and available on request.

Instructional materials shortage is a country-mean-centred index ranging between -1.15 and 2.61 based on the answers given by school principals. Higher values refer to a greater perceived hindrance of a school's capacity to provide instruction due to a shortage or inadequacy of instructional materials.

Mean classroom disruption. Using the method applied by Veerman (2015), we estimate a scale of classroom disruption. The scale was estimated using a Categorical Principal Components Analysis (CATPCA)[8] and using individual students' answers regarding the following classroom disruption topics during the reading lessons[9]: 'students don't listen to the teacher', 'students cannot work well', 'students don't start working for a long time after the lesson begins', 'the teacher has to wait until students are quiet' and 'there is noise and disorder'. Students answered these topics using the following four possible categories: 'never or hardly ever', 'some lessons', 'most lessons' or 'all lessons'[10]. We prefer to use mean classroom disruption as students are asked not to refer to their own individual disruptive behaviour but to their experience of disruption in the classroom. Therefore, we calculated the mean school classroom disruption value, which ranges between 0.94 and 1.67, using the individual scale of classroom disruption. Unfortunately, information concerning disruption during reading lessons is only available in PISA 2009. Therefore, we use the PISA 2009 data instead of the PISA 2012 data.

Descriptive statistics

The descriptive information in Table 5.2 shows an overall higher reading performance for migrant-origin students in schools with a higher proportion of native-origin students. School principals of schools with a lower percentage of native-origin students perceive less hindrance in schools due to a lack of qualified teachers. However, the advantage of these schools declines when the percentage of native-origin students is larger than 50 percent. Schools with fewer native-origin students show more hindrance due to a lack of instructional materials and small differences in classroom disruption. For students in schools with an ethnic diversity that is lower than expected due to the share of migrant-origin students (residualized ethnic diversity < 0), Table 5.2 shows a reading test score that is 9.71 points higher compared to students with an ethnic diversity as expected or higher according to the share of migrant-origin students (478.12 vs. 468.41, respectively). There is only a small effect size of 0.10. In addition, Table 5.2 shows more hindrance due to a lack of instructional materials and more classroom disruption in schools with a higher diversity than expected.

[8] We used the list-wise deletion setting of CATPCA.
[9] CATPCA in both cross-national data and country data show for these five topics factor loadings of 0.7 in all countries, except for Greece where "the teacher has to wait for quiet" where CATPCA shows a factor loading of 0.4. Therefore, we use all indicators except "the teacher has to wait for quiet."
[10] These categories are the inverted categories of the original PISA questionnaire.

Table 5.1: Means and standard deviations for migrant-origin students

	Minimum	Maximum	Mean	SD
Individual level				
Reading performance	59.29	740.05	472.31	92.82
ESCS	-5.84	3.22	-0.08	1.01
Non-vocational orientation	0.00	1.00	0.85	0.36
Grade	-3.00	3.00	-0.16	0.66
Female	0.00	1.00	0.50	0.50
Single mother	0.00	1.00	0.12	0.33
First generation	0.00	1.00	0.25	0.43
Same language at home	0.00	1.00	0.59	0.49
Missing same language	0.00	1.00	0.10	0.30
Mixed marriage	0.00	1.00	0.48	0.50
Missing mixed marriage	0.00	1.00	0.01	0.12
School level				
Proportion native-origin students*	0.00	0.97	0.58	0.23
Residiualised ethnic diversity	-0.62	0.19	0.00	0.05
Mean ESCS	-1.60	1.61	0.03	0.49
Variation ESCS	0.04	0.28	0.14	0.03
% female*	0.00	100.00	49.59	15.56
% single parents*	0.00	66.67	14.02	8.23
Qualified teacher shortage	-1.41	2.87	0.00	0.62
Materials shortage	-1.71	2.61	0.02	0.75
Disruption	-0.94	1.69	0.01	0.37
N countries	18			
N origin countries	76			
N schools	2708			
N students	21,333			

SOURCE. -PISA 2009, own computation
* Grand mean-centred in analyse

5.4 Models and results

Method and analytical strategy

We employed a multilevel model with two levels regarding individual cases in which students are nested in schools using the computer programme MLwiN. We use country-fixed effects and add dummies of the origin-regions of the students[11]. Besides

[11] We also tried dummies for every single origin country and interactions between the destination countries and origin countries, but these models did not converge due to the high number of dummies.

our main model, we control for the relationship between the ethnic composition variables and our explanatory variables. These models contain only explanatory variables as dependent variables at the school level. We use only country-fixed effects in these models, because , these models only contain the school-level.

We have added *teacher shortage* in our second model, *materials shortage* in our third model and *classroom disruption* in our fourth model. As a result, we can test our *teaching* hypothesis using Model 2, our *educational resources hypothesis* using Model 3 and our *disciplinary climate hypothesis* using Model 4.

Table 5.2: Descriptive information on the means of the dependent variables.

	N students	**N schools**	**Reading performance**	**Qualified teacher shortage**	**Material shortage**	**Classroom disruption**
0–25% native-origin students	2085	87	441.40	−0.16	0.29	−0.01
25–50% native-origin students	4699	241	446.77	0.08	0.09	0.06
50–75% native-origin students	8482	711	481.81	−0.01	−0.06	−0.00
75–97% native-origin students	6067	1669	489.42	−0.01	−0.01	−0.02
Ethnic diversity −0.62 – 0	8555	1188	478.12	0.00	−0.06	−0.04
Ethnic diversity 0 – 0.19	12.778	1520	468.41	−0.01	0.07	0.04

SOURCE. -PISA 2009, own computation

Results

Table 5.3 contains the results from Model 1 of all our control variables and the effect of the share of native-origin students and residualized ethnic diversity on reading performance at the individual level. Table 5.3 (Model 1) shows a positive effect of the proportion of native-origin students on reading performance and a significant negative association of -43,97 between (residualized) ethnic diversity and reading performance (standardized effect size is -0.02)[12].

[12] Our results show a significant association between ethnic diversity and reading performance both in 2009 and 2012. However, our results show a significant relationship between math performance in 2009 and no-significant relationship in 2012. Appendix P shows the effect sizes and significance of the relationship between the ethnic composition and maths and reading performance in PISA 2009 and 2012. Coefficients available on request.

Table 5.3: The effects of the school ethnic compositions and explanatory variables on reading performance of migrant-origin students in cross-national PISA data

	Model 1		Model 2		Model 3		Model 4	
	B	SE	B	SE	B	SE	B	SE
Constant	404.14	6.25	404.26	6.24	404.29	6.24	400.83	6.21
School level								
Proportion of native-origin students	8.04	4.54	8.69	4.54	8.50	4.54	8.11	4.49
Residuals ethnic diversity	-43.97*	17.97	-44.77*	17.93	-43.29*	17.98	-34.19	17.77
Qualified teacher shortage			-3.66*	1.29	-3.49*	1.30	-3.02*	1.29
Materials shortage					-1.15	1.02	0.82	1.01
Classroom disruption							-14.26**	2.27
Destination country fixed-effects	yes		yes		yes		yes	
Origin region fixed-effects	yes		yes		yes		yes	
Variance								
School level	700.37*	39.06	695.41*	38.89	694.68*	38.87	665.03*	37.88
Individual level	4386.33*	44.93	4386.46*	44.92	4386.52*	44.93	4389.46*	44.94
Deviance Information Criterion	241297.81		241289.72		241288.72		241249.65	

SOURCE. -PISA 2009, own computation.
NOTE. -We control at the individual level for ESCS, non-vocational orientation, grade, female, single mother, first generation, destination country language, destination country language missing, mixed marriage and mixed marriage missing. At the school level, we control for mean ESCS, variation ESCS, proportion of females and proportion of single parents.
N schools 2708, N students 21,333.
$^{**}p < 0.01$; $^{*}p < 0.05$.

Model 1 (Table 5.3) shows a non-significant association between the proportion of native-origin students and reading performance of 8.04 (standardized effect size is 0.02). We have added the shortage of qualified teachers in the school in our second model as an indicator to test the *teaching hypothesis*. Table 5.3 (Model 2) shows that the effect of the proportion of native-origin students on reading performance becomes 8.69 due to the implementation of the *shortage of qualified teachers*. Consequently, the teacher shortage reinforces the negative relationship between the proportion of native-origin students and reading performance. Therefore, we reject the *teaching hypothesis*.

Table 5.4: The effects of the school ethnic compositions on explanatory variables of schools with migrant-origin students in cross-national PISA data

	Qualified teacher shortage		**Material shortage**		**Classroom disruption**	
	Model 1		**Model 2**		**Model 3**	
	B	**SE**	**B**	**SE**	**B**	**SE**
Constant	0.05	0.08	0.07	0.11	-0.31	0.05
School level						
Proportion of native-origin students at school	0.16*	0.07	-0.12	0.09	-0.03	0.04
Residuals ethnic diversity of school	-0.18	0.33	1.51*	0.43	0.74*	0.19
Destination country fixed-effects	yes		yes		yes	
Variance						
School level	0.35**	0.01	0.57**	0.02	0.12**	0.00
Deviance Information Criterion	4800.23		6143.02		1831.64	

SOURCE. -PISA 2009, own computation.
NOTE. - We control at the school level for mean ESCS. variation ESCS. proportion of females and proportion of single parents. N schools 2708.
** p < 0.01; *p < 0.05.

Table 5.3 (Model 3) shows only a small change in the relationship between share of native-origin students and reading performance, but a decline in the relationship between ethnic diversity and reading performance due to the implementation of *materials shortage*. Therefore, we reject the *educational resources hypothesis*. Table 5.3 (Model 4) shows a decline in the relationship between ethnic diversity and reading performance of 21 percent due to the implementation of *classroom disruption*. Moreover, this relationship becomes non-significant.

We expect a significant relationship between our independent variables of interest (proportion of native-origin students and residualized ethnic diversity) and the explanatory variables. Consequently, we test these relationships in Table 5.4 using a model that is particularly comparable to the model of Veerman (2015). Model 1 contains *shortage of qualified teachers* as a dependent variable, Model 2 contains *materials shortage* and Model 3 contains *classroom disruption*. The results for the explanatory variables represented in Table 5.4 show an unexpected significant positive association of 0.16 (standardized effect size is 0.05) between the proportion of native-origin students and the shortage of qualified teachers and a non-significant association between the share of native-origin students and materials shortage. However, Table 5.4 (Model 2) shows a significant positive association of 1.51 (standardized effect size is 0.06) between *ethnic diversity* and *material shortage* and a significant positive association of 0.74 (standardized effect size is 0.06) between *ethnic diversity* and *classroom disruption*[13]. Therefore, we confirm only the *disciplinary climate hypothesis*. More specifically, the findings suggest that disciplinary climate has partly an independent effect on reading performance, and partly forms an explanation for the association between diversity and performance. Moreover the results show the interrelatedness of the mechanisms, because disciplinary climate explains 13 percent of the association between teacher shortage and reading performance.

Robustness checks
We checked for the possible influence of cross-national response styles for classroom disorder (Gerber, 2012; Veerman, 2015) using classroom disorder with grand mean-centred values at the national level (see Appendix M). Appendix M shows comparable parameter estimates to Table 5.3 (Model 4) for classroom disruption. This result is robust even under the extreme assumption that differences in the experience are fully explained by country differences.

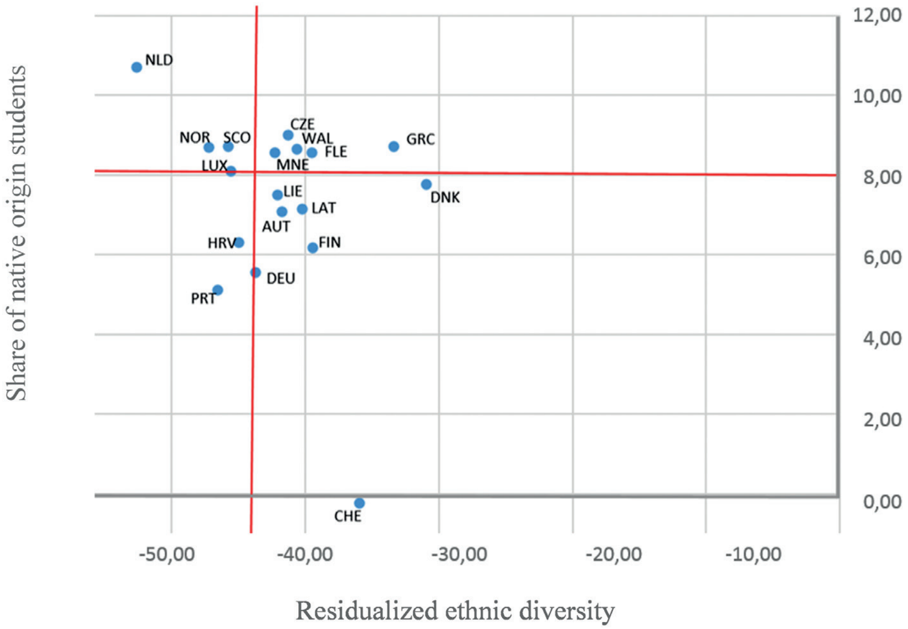
We analyse the results in Table 5.3 (Model 1) for robustness by omitting countries one by one because the study of Veerman and Dronkers (2016) shows different results between destination countries regarding the influence of ethnic diversity for students of Turkish descent. Figure 5.2 shows a decline in the association between the ethnic diversity and reading performance when we omit Switzerland, Greece or Denmark. Although Figure 5.2 shows that the coefficients of the relationship between ethnic diversity and reading performance remain negative, the coefficients of ethnic diversity become non-significant when we omit Greece or Denmark.

We employed a cross-classified multilevel model with four levels regarding individual cases in which students are nested in schools and also nested in different countries of origin across different destination countries. Consequently, our origin level differentiates the variance between different origin groups in different destination countries. This differentiation could be important because migration groups might be differently incorporated and selected in different destination

[13] Our results show no significant association between the share of native-origin students and the shortage of qualified maths teachers and qualified reading teachers using PISA 2012. Moreover, we found no significant association between ethnic diversity and classroom disruption during math lessons but a significant association between share of native-origin students and classroom disruption during math lessons using PISA 2012.

countries (Van Tubergen, 2006). The advantage of this model is that it estimates the variance of every single origin group. We estimate this model using Markov Chain Monte Carlo (MCMC) estimation techniques because MLwiN only allows MCMC in cross-classified models. MCMC is a Bayesian estimation technique that estimates both parameter estimatesand confidence intervals. The confidence intervals indicate a 95 percent probability that the parameter estimate will lie between two values of the interval in Bayesian statistics.
Appendix N shows a comparable relationship between ethnic diversity and reading performance in Table 5.3 when we use a cross-classified model that controls for the variation of the different origin countries of the students.

Figure 5.2: Ethnic composition estimates on reading performance in cross-national PISA 2009 data with countries omitted one by one.[14]



NOTE. –Residualized ethnic diversity (Table 5.3, Model1)
x-asis: Greece and Denmark non-significant
y-axis: Netherlands and Czech Republic significant

[14] AUT = Austria, CHE = Switzerland, CZE = Czech Republic, DNK = Denmark, DEU = Germany, GRC = Greece, HRV= Croatia, FIN = Finland, FLE = Flemish, LIE= Liechtenstein, LUX = Luxembourg, LVA = Latvia, MNE = Montenegro, NLD = Netherlands, NOR = Norway, PRT = Portugal, SCO = Scotland and WAL = Wallonia.

Finally, we elaborate whether these results are biased as a consequence of selectivity of students through estimating instrumentalized variables (IV)[15]. Our instrument is a dummy variable that indicates whether the school is located in a city. The reference category consists of the schools that are located in a town, small town or village. Urbanisation is an appropriate instrument for the share of native-origin students as both the independence assumption and exclusion restriction seems satisfied. First, the IV must be independent of the vector of potential outcomes and potential treatment assignments. Although one could argue that higher performing children are more likely to reside in cities due to a 'brain drain' from rural areas, cities also attract parents with a lower level of education. Moreover, more highly educated parents may return to villages from large cities after a first job in the city (Artz 2003). Consequently, we could argue that living in a city is randomly assigned to children with different school performances. This theoretical assumption is in line with the non-significant association between urbanisation and math performance, but not for reading performance[16].

Secondly, living in a city may not affect other explanations. Immigrants generally choose to live in neighbourhoods in large cities where co-ethnics or other ethnic groups live. Research regarding location choice of migrants in both European and American contexts indicates that the presence of other immigrants in large cities is the main determinant of settlement choices. The literature suggests that other factors such as economic prospects play a minor role in the settlement in cities (*Zavodny* 1999; Zorlu and Mulder 2008).

Nevertheless, specific groups may have specific settlement determinants. For instance, migrants from the countries around the destination country might not necessarily settle in urban areas, but instead choose to live near the border of their country of origin. In addition, these migrants may also settle near multinationals that frequently reside in large cities. Moreover, the disciplinary climate and school organization are associated with an urban context in a number of countries (OECD, 2013). However, these associations differ across countries. Consequently, given the main findings in the literature on settlement choices of immigrant origin students and differences in the association between urbanisation and other explanations, we expect overall that urbanisation particularly influences the share of native-origin students.

The F-statistic in Appendix O indicates that we could use urbanisation as an instrument for the share of native-origin students (Yogo and Stock 2005). While we might also expect more possible interethnic contacts in large cities, it is unclear whether the number of possible interethnic contacts (net of the share of migrant-origin students)

[15] We use the programme STATA to estimate our models with instrumental variables because 2SLS is not possible in MLwiN. Although we prefer models with random-effects, 2SLS with random-effects is not possible in STATA. Therefore, we use robust standard errors clustered for schools with fixed origin country and clusters of origin-country effects.

[16] We added urbanisation to our first model in Table 3.3 and found a non-significant parameter coefficient.

is higher in large cities. For instance, Figure 5.1 shows that single ethnic groups may also concentrate in schools with a high share of migrant-origin students. Therefore, urbanisation could also lead to a lower opportunity of interethnic contacts because migrant groups have more opportunities to organise their own schools. Empirical checks show that urbanisation is a weak instrument for residualized ethnic diversity[17]. Consequently, we only instrumentalized the share of native-origin students for our countries with a significant association between the share of native-origin students and reading performance.

Appendix O (Model 3) shows that the instrumentalized coefficients become negative in comparison with OLS with robust standard errors. However, Appendix O (Model 1) shows that robust standard errors underestimate the association between the share of native-origin students and reading performance.

5.5 Conclusion and discussion

The relationship between ethnic composition and school performance is widely discussed in the current debate on school segregation. Although a number of recent studies found significant relationships between the share of native-origin students and school performance or between ethnic diversity and school performance for migrant-origin students, the mechanisms behind these relationships have barely been studied. Consequently, the ensuing debate has been particularly focused on influencing the ethnic composition of schools and not on influencing possible mechanisms that occur as a result of ethnic composition.

In this study, we tested three mechanisms that could be used to explain the negative relationship between the ethnic composition and school performance for migrant-origin students: *teaching mechanisms, organizational mechanisms* and *peer-group mechanisms*. Whereas a number of studies only focus on ethnic diversity or the proportion of migrant-origin students, this study uses both ethnic diversity and the proportion of native-origin students in its models as these represent variables that are conceptually different and refer to different mechanisms. We use residualized ethnic diversity to measure the mechanisms that might occur due to the higher number of possible interethnic links in schools. We used shortage of qualified reading teachers as an indicator for *teaching mechanisms* and shortage of materials as an indicator for *organizational mechanisms*. Moreover, we used classroom disorder as an indicator of *peer-group mechanisms*. Our disorder indicator includes the students' interpretation of the working climate and disruption in the classroom during reading classes.

We found non-significant relationships between ethnic composition and reading performance for native-origin students. Moreover, our results show a non-significant positive association between the proportion of native-origin students and reading

[17] Results available on request.

performance, for migrant-origin students. This finding rejects the idea that teachers in schools with a lower share of native-origin students specialize in considering the needs of migrant-origin students (Peetsma et al. 2006). Although, less hindrance on learning due to a lack of qualified teachers in schools with a higher proportion of native-origin students was expected, our results show that school principals of schools with a higher proportion of native-origin students perceive an even greater hindrance on learning due to a lack of qualified teachers. This teaching mechanism could explain a small part of the positive association between the share of native-origin students and reading performance. Consequently, a lack of qualified teachers intensifies the positive relationship between the proportion of native-origin students and reading performance.

Although our robustness check indicates that the significant relationships between the proportion of migrant-origin students and reading performances may be explained by the selection of specific students, our results show that the relationship between the share of native-origin students and reading is underestimated using robust standard errors. Moreover, our instrument only shows a local treatment effect for those schools whose composition is influenced by urbanisation. Consequently, the non-significant parameter estimates do not show the influence of ethnic composition for schools in cities that did not receive a high proportion of migrant-origin students due to the neighbourhood composition within the city. This also applies to schools that knowingly attract a higher proportion of native-origin students than may be expected due to the urbanisation context. Particularly relating to the latter, it may be the case that these schools attract economically better-situated migrant-origin students that move to schools with more resources (Driessen 2002). Further longitudinal research that focuses on these specific students might explain the difference between the instrumentalized and non-instrumentalized results. Although the theory suggests that particularly urbanisation explains the share of native-origin students of schools, we and others cannot exclude that other determinants of school performance may select for specific groups of migrants to cities.

Although the descriptive results show that both schools with more migrant-origin students suffer from a shortage or inadequacy of instructional materials, the multilevel regressions show that a shortage of instructional materials explains a part of the relationship between ethnic diversity and reading performance and not the relationship between the share of native-origin students and reading performance. Our results for migrant-origin students demonstrate a significant negative relationship between ethnic diversity and reading performance. The parameter estimate of ethnic diversity declines when we add classroom disruption to our model. However, the relationship between shortage of teaching materials and reading performance is non-significant. We found a significant positive relationship between ethnic diversity and classroom disruption. Consequently, classroom disruption partly explains the negative relationship between ethnic diversity and reading performance.

Based on the tension and feelings of belonging perspectives, we expected more classroom disruption in schools with a higher ethnic diversity. Although we found a significant relationship between ethnic diversity and classroom disruption during reading lessons, our analysis shows a non-significant association between ethnic diversity and classroom disorder during math lessons. Consequently, the result of ethnic diversity on classroom disorder during math lessons is not comparable to the earlier study by Veerman (2015). The difference in these results might be due to a difference between reading and math lessons or the two-thirds selection of students that had the possibility to response to the disorder question in PISA 2012, but it could also indicate non-robust results for the association between ethnic diversity and classroom disruption.

Van de Werfhorst, Bergstra and Veenstra (2012) show that the influence of the school-level disciplinary climate could be overestimated when models do not control for individual disciplinary behaviour. However, checks with individual truancy behaviour in the PISA 2012 data show only a decline of ten percent of the effect of school-level disciplinary climate on math performance. Consequently, the PISA 2009 results suggest that the association between ethnic diversity and reading performance may only partially be explained by disruptive behavioural mechanisms.

This study only showed explanatory mechanisms of ethnic diversity on reading performance for migrant-origin students as we – and previous studies – have already shown no significant relationships for native-origin students (Dronkers and Van der Velden 2013) and mixed findings for the relationship between ethnic diversity and math performance for migrant-origin students. The effect sizes of ethnic diversity on school performance for migrant-origin students are small. Consequently, policymakers should also take into account the difference between school subjects. Furthermore, policies that focus on desegregation might influence specific target groups differently. Educational policies could also focus on the mechanisms behind the relationship between the ethnic composition and school performance instead of only focusing on desegregation policies. Finally, it must be noted that with the cross-sectional data that we and others have used, claims about causal effects of ethnic diversity on pupils' performance should be made with caution.

Further research might unravel possible positive mechanisms at the school level that influence the relationship between ethnic composition and school performance by following the notion of enrichment through different ethnic cultures or might focus on the positive relationship between share of native-origin students and math performance for native-origin students.

Chapter 6

Conclusion

6.1 What has this study done?

This thesis contributes to an emerging field on the influence of ethnic composition on schooling outcomes, distinguishing between the share of migrant-origin students and their ethnic diversity (Abascal and Baldassarri 2015; Dronkers 2010; Maestri 2011a; Van Houtte and Stevens 2009). Although ethnic diversity and the share of migrant-origin students are strongly correlated, both indicators of ethnic composition are conceptually different. Whereas the share of migrant-origin students only takes into account the proportion of the group of all migrant-origin students compared to native-origin students, ethnic diversity takes into account the numbers and relative sizes of all the different ethnic groups. Consequently, a high share of migrant-origin students refers to a greater opportunities for contact with migrant-origin students and fewer opportunities for contacts with native-origin students. Nevertheless, students in a school with higher diversity have greater opportunities for interethnic contact in school than students in schools with less ethnic diversity. Therefore, ethnic diversity and the share of migrant-origin students could imply different mechanisms to explain the relationship between ethnic composition and school performance. For example, schools with a larger share of migrant-origin students could specialize in catering to the needs of migrant-descent students, but schools with higher ethnic diversity need to meet the more diverse needs of their students.

The use of both ethnic diversity and the share of migrant-origin students in research raises questions about the empirical possibilities of differentiating between these concepts (Herweijer 2011; Janmaat 2012; Sykes and Kuyper 2013). Moreover, the generalizability of the outcomes to different contexts is discussed (Herwijer 2011; Verbeek et al. 2015). Although it is argued that higher ethnic diversity could lead to more ethnic tensions in schools (Esser 2004), research that differentiates between ethnic diversity and the share of migrant-origin students does not focus on the behaviour of students during lessons. In particular, the relationship between the behaviour of students during lessons and ethnic diversity is interesting, because student behaviour could explain part of the relationship between ethnic diversity and school performance and could be influenced by different country contexts where ethnic diversity is differently appreciated. The possibility in recent datasets of distinguishing between ethnic diversity and the share of migrant-origin students in a growing number of countries provides an opportunity to partly disentangle how and why ethnic composition is related to school performance.

The aim of this thesis is to contribute to the following three research questions.

RQ1: What are the relationships between the sub-dimensions of ethnic composition (share of migrant-origin students and ethnic diversity) and school performance and disruptive behaviour in Western societies?

RQ2: To what extent can teaching, organizational, and peer-group mechanisms explain the relationship between ethnic composition (share of native-origin students and ethnic diversity) and school performance?

RQ3: To what extent does the relationship between ethnic diversity (net of the share of migrant-origin students) and student disruptive behaviour differs across countries due to integration policies?

Relationship between the sub-dimension of ethnic composition and school performance or disruptive behaviour

Some studies recognize the difference between ethnic diversity and the share of migrant-origin students but prefer to use only ethnic diversity, since they argue that the use of both indicators could lead to multicollinearity (Herweijer 2011; Janmaat 2012). However, the combination of ethnic diversity and the share of migrant-origin students in one research model reveals that the impact of ethnic diversity is overestimated in research models that focus only on ethnic diversity (Abascal and Baldassarri 2015).

Chapter 2 show high variance inflation factors (VIFs) if both ethnic diversity and the share of migrant-origin students are included in one research model, using Dutch primary school data. Consequently, these VIFs indicate that the standard errors of research models that combine ethnic diversity and the share of migrant-origin students for school performance are inefficient due to problems of multicollinearity (Kleinbaum et al. 2008).

Because the use of both ethnic diversity and the share of migrant-origin students leads to multicollinearity, a research model is employed that empirically distinguishes ethnic diversity from the share of migrant-origin students. This research model calculates ethnic diversity residualized on the share of migrant-origin students. Residualization offers a solution to the problem of multicollinearity. Residualized ethnic diversity is conceptualized as ethnic diversity given the share of migrant-origin students. High residualized ethnic diversity refers to greater opportunities for interethnic contact than could be expected given the share of the migrant-origin students of the school. With residualization, the diversity index is uncorrelated with the share of migrant-origin students. Therefore, the parameter estimates of the share of migrant-origin students are mostly comparable to those of studies that only focus on the relationship between the share of migrant-origin students and school performance.

In all the chapters I use residualized ethnic diversity and replicate the studies of Dronkers (2010) and Maestri (2011a), who include both ethnic diversity and the share of migrant-origin students in research models on school performance, using more recent available datasets.

Table 6.1: Standardized effect sizes of ethnic diversity on the dependent variables for native-origin students

Dataset	Group	Math performance	Reading performance	Disruptive behaviour	Chapter
COOL 2008	Grade 2, Netherlands	-0.01	-0.01		2
COOL 2008	Grade 5, Netherlands	0.03	0.01		2
COOL 2008	Grade 8, Netherlands	-0.08	-0.08		2
PISA 2009	15-year-olds, 18 European countries	-0.01	-0.00	0.06*	5
PISA 2012	15-year-olds, 18 European countries	-0.01*	-0.01	0.01	5

NOTE. - $^*p < 0.05$

Table 6.1 shows the relationship between ethnic diversity and the dependent variables for native-origin students. The relationships between ethnic diversity and school performance for native-origin students are mostly non-significant. There is a significant positive relationship between ethnic diversity and classroom disruption in the PISA 2009 data and a significant negative relationship between ethnic diversity and reading performance in the PISA 2012 data. The PISA 2009 survey questioned students about disruptive behaviour during reading lessons and PISA 2012 questioned them about disruptive behaviour during math lessons. Native-origin students suffer more from classroom disruption in schools with higher ethnic diversity during reading lessons. However, classroom disruption during math lessons relates non-significant to ethnic diversity.

Mostly non-significant relationships between ethnic diversity and school performance for native-origin students.

Table 6.2 shows mostly non-significant relationships between ethnic diversity and school performance in Dutch primary education students and a negative relationship only between ethnic diversity and reading comprehension for migrant-origin students in eighth grade, using Dutch 2008 primary school data.

Table 6.2 shows negative relationships between ethnic diversity and reading performance for all migrant-origin and Turkish-descent students in secondary education, using PISA 2009 and 2012 data. However, Table 6.2 shows a non-significant relationship between ethnic diversity and math performance in PISA 2012 for all migrant-origin students. Consequently, I find mostly negative relationships between ethnic diversity and reading performance and mixed findings for the relationship between ethnic diversity

Mostly negative relationships between ethnic diversity and reading performance and mixed findings for the relationship between ethnic diversity and math performance for migrant-origin students.

and math performance for migrant-origin students. Moreover, robustness checks show that the significance of the relationship between ethnic diversity and the school performance of migrant-origin students is driven mostly by Greece and Denmark. Finally, both Tables 6.1 and 6.2 show that the effect size of the relationship between ethnic diversity and school performance is small, as for most school-level variables.

Table 6.2: Standardized effect sizes of ethnic diversity on dependent variables for migrant-origin students

Dataset	Group	Math performance	Reading performance	Disruptive behaviour	Chapter
COOL 2008	Grade 2, Netherlands	-0.04	-0.06		2
COOL 2008	Grade 5, Netherlands	-0.05	-0.05		2
COOL 2008	Grade 8, Netherlands	-0.06	-0.13*		2
PISA 2009	15-year-olds, 18 European countries	-0.04*	-0.02*	0.06*	5
PISA 2012	15-year-olds, 18 European countries	-0.02	-0.03*	0.02	5
PISA 2009	15-year-olds of Turkish descent in seven countries	-0.15*	-0.11*		3
PISA 2009	15-year-olds of Turkish descent in Denmark	-0.29	-0.32*		3
PISA 2009	15-year-olds of Turkish descent in the Netherlands	0.26	0.29*		3

NOTE. - *p < 0.05.

Although Table 6.2 shows significant negative relationships between ethnic diversity and reading performance in secondary education, it shows a negative relationship between ethnic diversity and school reading performance in Denmark and a positive relationship between ethnic diversity in the Netherlands for 15-year-old Turkish-descent students.

As summarized in Tables 6.1 and 6.2, significant positive associations are found between ethnic diversity and classroom disruption during reading lessons for students in 18 European countries in PISA 2009. Classroom disruption is measured with a school-level scale that shows the opinions of students about how disruptive their classes are. However, the PISA 2012 data show a non-significant relationship between ethnic diversity and classroom disruption during math lessons. The evidence of a significant negative relationship between ethnic diversity and classroom disruption is therefore somewhat mixed.

The use of both ethnic diversity and the share of migrant-origin students enables me to study the results of both the relationships between ethnic diversity and school performance and between the share of migrant-origin students and school performance. Appendix Q summarizes the relationship between the share of native-origin students and school performance. I find mostly non-significant relationships between the share of native-origin students and school performance for migrant-origin students. Appendix Q shows significant positive relationships between the share of native-origin students and math performance for native-origin students. The association between the share of native-origin students and reading performance is, for native-origin students, only significant in Dutch primary education.

One of the problems of interpreting the association between ethnic composition and school performance is that the relationship could be driven by endogenous schooling choice. Therefore, a quasi-experimental design was conducted using the urbanization of the school as an instrumental variable for the share of native-origin students in the school. Urbanization is a strong instrument for the share of native-origin students in the school but a weak instrument for residualized ethnic diversity. The results of the quasi-experimental design indicate that the relationship between the share of native-origin students and school performance is overestimated in the non-quasi-experimental multi-level design. However, the results of the quasi-experimental design refer only to local treatment for those schools whose ethnic composition has been influenced by urbanization. Moreover, the quality of the instrument used remains under discussion, because it is impossible to control for all possible determinants that could select specific groups of migrant-origin students into cities.

Mechanisms that could explain the relationship between ethnic composition and school performance

The distinction between ethnic diversity and the share of native-descent students also makes it possible to empirically investigate mechanisms that could explain the relationship between ethnic composition and school performance. Sykes and Kuyper (2013) mention three clusters of interrelated mechanisms that could explain such a relationship: (1) *teaching mechanisms*, (2) *organizational mechanisms,* and (3) *peer-group mechanisms*.

From a teaching perspective, Dronkers and Van der Velden (2013) argue that teachers in schools with higher diversity need to adapt their teaching to more different a greater variety of needs. For instance, students have different foreknowledge of topics due to their ethnic background. Because teaching to students with different needs is more complex, this *teaching mechanism* could explain the negative relationship between ethnic diversity

> *Principals perceive greater hindrance from shortages of qualified teachers in schools with higher percentages of native-origin students.*

and school performance. Positive relationships between the share of migrant-origin students and school performance are explained with the specialization of teachers to the specific needs of their students (Peetsma et al. 2006). However, it is also argued that schools with a higher share of migrant-origin students have less-educated teachers. In Chapter 5, I conduct an empirical multi-level study on whether a shortage of qualified teachers can explain the relationship between the share of native-origin students and reading performance. The results, controlling for students' mean social economic and cultural background, unexpectedly show that school principals perceive greater hindrance from a qualified teacher shortage in schools with higher percentages of native-origin students. Moreover, the results show a stronger relationship between the share of native-origin students and reading performance for 15-year-old migrant-descent students in Western European countries when controlling for the shortage of qualified teachers.

The literature uses *organizational mechanisms* only to explain relationships between the share of native-origin students and school performance and not to explain the relationships between ethnic diversity and school performance. Nevertheless, Chapter 5 shows that a shortage of teaching materials explains 3 percent of the relationship between ethnic diversity and school performance but not the relationship between the share of native-origin students and reading performance.

> *Teaching materials shortage explains 3 percent of the relationship between ethnic diversity and school performance.*

From a peer-group perspective, positive relationships between the share of native-origin students are explained by mechanisms of greater opportunities for contact with native-origin students, who speak the destination language as their mother tongue (Driessen 2002). However, greater opportunities for contact with positively-selectively migrant-origin students could also lead to higher school performances of students. Both positive and negative mechanisms are mentioned to explain the relationship between ethnic diversity and school performance. First, higher ethnic diversity could provide stronger incentives for orientation toward mainstream culture (Lazear 1999; Schachner et al. 2016). Moreover, the greater opportunity for contacts with students from different ethnic backgrounds could enrich students with potentially different ideas (Lazear 1998). However, more possible interethnic contacts could also lead to interethnic tensions, because students in schools with greater opportunities for interethnic contact need to bridge more ethnic barriers (Esser 2004). Ethnic tensions or lesser feelings of belonging can negatively influence students' school performance (Hoxby 2000; Osterman 2000). These mechanisms of interethnic tension or lesser feelings of belonging could

> *Classroom disruption explains 21 percent of the negative relationship between ethnic diversity and reading performance*

become manifest in the disruptive behaviour of students.

Table 6.2 shows that ethnic diversity is positively associated with classroom disruption during reading lessons but there is no significant relationship between the share of native-origin students and classroom disruption. Moreover, Table 6.2 shows a negative association between ethnic diversity and reading performance. Therefore, one could test whether classroom disruption is a *peer-group* mechanism that explains the negative relationship between ethnic diversity and reading performance due to the increase in possible interethnic contacts for migrant-origin students. Chapter 5 shows that classroom disruption explains 21 percent of the negative relationship between ethnic diversity and reading performance. Moreover, this relationship between ethnic diversity and reading performance becomes non-significant.

Cross-national differences in the relationships between ethnic diversity, classroom disruption, and integration policies

Although the enrichment and tension perspectives predict opposite directions for the relationship between ethnic diversity and school performance, these mechanisms occur in institutions where teachers and policies can influence these relationships. Relationships between different ethnic groups are optimal when four conditions are fulfilled: (1) equal status, (2) common goals, (3) intergroup cooperation, and (4) authority support (Allport 1954). These conditions can be influenced by relevant school-level policies. Moreover, these conditions can also be structured and formed by institutional norms at the country level (Pettigrew 1998), which become visible as national policies. In particular, countries can support the equal status of native- and migrant-descent students with integration policies and providing both groups of students equal access to education and equal opportunities for access in the labour market to their parents. This form of authority support becomes especially visible in countries with integration policies providing migrant-origin students and their parents equal opportunities in education and other segments of life. These policies can reduce interethnic barriers and tensions between recently arrived immigrants, older immigrant groups, and native-descent groups. However, equal opportunities can also create incentives for tension between native- and migrant-origin students, because the natives could feel 'threatened' (Blalock 1957). Because both mechanisms can occur at the same time, interactions between integration policies ethnic diversity on school performance or student behaviour could become non-significant.

Students in countries with a more inclusive integration policy are harmed by the relationship between ethnic diversity and classroom disruption.

Chapter 4 shows the significant negative interaction of a more inclusive integration policy and ethnic diversity on classroom disruption. Therefore, the significant positive relationship between ethnic diversity and classroom disruption during reading lessons is weaker in countries with a more inclusive integration policy. However, Tables 6.1 and 6.2 show no significant relationship between ethnic diversity and disruption during math lessons. Consequently, Chapter 5 indicates that students in countries with a more inclusive integration policy (measured by a higher MIPEX score) are less harmed by the relationship between ethnic diversity and classroom disruption during reading lessons.

6.2 What have we learned?

Studies on ethnic school composition and school performance hardly take into account heterogeneity in ethnic origin groups, because social science studies focuses mostly on the relationship between the share of migrant-origin students and school performance. The combined use of the share of migrant-origin students and ethnic diversity in studies on the relationship between ethnic composition and school performance has been rejected due to expected problems of multicollinearity. Moreover, most earlier studies that focus on the relationship between the ethnic composition of schools and school performance were interested in the direction and significance of the effects. This approach leads to problems in understanding why the relationships occur, to problems to give indications of the possible impact of political interventions. Finally, different outcomes in the relationship between ethnic composition and school performance in different countries lead only to discussions on the generalizability of the results and not to questions on institutional differences between the countries.

The residualized ethnic diversity method in this study clarifies the discussion about the use of two highly correlated variables in one research model. Whereas some argue that the results for the relationship between ethnic diversity and the dependent variables are biased when a research model not include the share of migrant-origin students (Abascal and Baldassarri 2015), others argue that these two indicators of ethnic composition should not be included in one research model due to problems of multicollinearity (Herweijer 2011; Janmaat 2012; Sykes and Kuyper 2013). The current solution of dropping one of the two variables to overcome problems of multicollinearity is not the only option. The use of both ethnic diversity and the share of migrant-origin students in one research model leads to inefficient standard errors due to multicollinearity. The method employed with residualized ethnic diversity allows for differentiation between two highly correlated variables in one research model and showing the relationship between ethnic diversity net of the share of migrant-origin students without inefficient standard errors for the share of migrant-origin students.

The method of residualization as a solution to multicollinearity has been discussed to avoid biased estimates (York 2012). However, future research hindered by multicollinearity could residualize one of two highly correlated variables on the other to overcome problems of multicollinearity when they interpreted ween The residualized variable and the dependent variable must be interpreted given the highly correlated variable on which it is residualized. The relationship between the unresidualized variable and the dependent variable should be interpreted as uninfluenced by the residualized variable. Therefore, the results of the unresidualized variable should not be seen as biased but, instead, comparable to a design that drops the other, highly correlated variable.

The growing interest in the relationship between ethnic composition and school performance is an indication of the relative importance of this research topic in the research field. Although significant relationships between ethnic composition variables and school performance that I and other researchers have found could be an indication to give policy advice to influence ethnic composition, this study shows that the effect sizes of the relationship between ethnic composition variables and school performance or disruptive student behaviour are small. Future research on ethnic composition effects could more carefully interpret such effect sizes to give policymakers insight into opportunities to provide greater equal opportunity for migrant-origin students by changing ethnic composition.

A number of explanatory mechanisms are mentioned in the literature that focuses on ethnic composition and school performance. For instance, positive relationships between ethnic diversity and school performance are explained by enrichment by different cultures and negative relationships by possible interethnic tensions due to more possible interethnic contact. However, the direction and significance of the effects could be influenced by different, simultaneous explanatory mechanisms. Therefore, a focus on the relationship between ethnic composition and explanatory mechanisms could reveal whether these mechanisms actually occur and could provide information for concrete policy advice. This study shows that the disruptive behaviour of students during reading lessons explains part of the negative relationship between ethnic diversity and reading performance in European countries. Whereas ethnic composition can hardly be influenced by teachers, the empirical findings of this thesis confirm a mechanism that shows how teachers can influence the school performance of their students in schools with high ethnic diversity. Teachers in such schools could focus on creating a less disruptive climate by giving their students more effective study time to achieve higher reading performances. The four conditions of the contact hypothesis could provide teachers ideas for reducing interethnic tensions and reinforcing a positive working climate.

The outcomes of the relationships between ethnic diversity and school performance in cross-national data are discussed in terms of their generalizability to countries that were not yet included in the cross-national dataset. This study indicates that differences in the relationship between ethnic diversity and classroom disruption can be partly explained by differences in integration policies. Consequently, future debate on generalizability should not only focus on the significance of the relationship in different countries, but also take into account institutional differences across countries.

Whereas multiculturalism focuses on constructing new equal relationships between different origin-country groups (Kymlicka 2012), integration policies focus on the equality of the rights of recent migrant citizens, migrant-origin citizens, and native-origin citizens. Inclusive integration policies are a condition for the success of multiculturalism (Kymlicka 2012). The advantages and detrimental effects of multiculturalist policies are discussed by politicians and social science researchers (Duyvendak et al. 2013; Koopmans 2010). Although multiculturalism policies could relate to the social and economic marginalization of immigrants (Koopmans 2010), it is argued that multiculturalist policies work best in countries with high ethnic diversity because the native-origin citizens will not feel threatened by a large immigrant group (Kymlicka 2012). Countries where native-origin citizens do not feel threatened by new immigrants will give these immigrants more equal rights (more inclusive integration policies) more quickly. The results of this thesis indicate weaker relationships between the ethnic diversity of schools and disruptive behaviour in the classroom in countries with a more inclusive integration policy. In Portugal, the country with the most inclusive integration policy, the relationship between ethnic diversity and disruptive behaviour even becomes non-significantly negative. Therefore, this study shows how inclusive integration policies relate to the everyday relations of both native- and migrant-origin students in ethnically diverse schools and to the goals of multiculturalism policies. Moreover, inclusive integration policies indirectly provide students in ethnically diverse schools more opportunities to work on their reading performance through a decline of disruption in highly ethnic diverse classrooms.

The interaction between more inclusive integration policies and classroom disruption provides a possible mechanism that explains the smaller gap between the educational outcomes of migrant- and native-origin students in countries with a more inclusive integration policy (Van de Werfhorst, Van Elsas and Heath 2014). Finally, the findings strengthen the idea that general policies that focus on immigrants' equal opportunities work in ethnically diverse settings. Moreover, the results show how contacts between different ethnic groups are structured and formed at the societal level through two of the conditions of the contact hypothesis (Allport 1954; Pettigrew 1998): equal status within the situation and authority support.

6.3 Future research

A recent study in a German urban context shows an increase in the mainstream cultural orientation in schools with higher ethnic diversity and a decrease in such orientation in schools with a higher share of migrant-origin students (Schachner et al. 2016). The combination of that study and this thesis indicates a possible trade-off between school performance and mainstream culture orientation. However, the findings of an increase in cultural mainstream orientation in more ethnically diverse schools could also be driven by the urban context of these schools, since students in an urban context are more used to dealing with ethnic diversity (Braster and Dronkers 2013). Future research could reveal whether an association between ethnic diversity and mainstream orientation also occurs in non-urban contexts and other countries.

Future studies could also focus on outcomes other than school performance and disruptive behaviour, such as societal attitudes or positive mechanisms such as cultural enrichment to explain the relationship between ethnic diversity and school performance. Moreover, these studies could focus on how differences in teacher competencies explain the relationship between ethnic diversity and school performance. Furthermore, this study shows that the association between ethnic diversity and classroom disruption differs structurally across countries with different integration policies. Therefore, future research on the ethnic composition of schools could use a country-comparable design for countries with different integration policies and should be cautious in generalizing the results of single-country studies to other countries. Finally, the important differentiation between the share of migrant-origin students and ethnic diversity should be implemented in other studies on ethnic composition in specific contexts that use (quasi-) experimental designs.

6.4 Policy implications

Although this thesis shows especially negative relationships between ethnic diversity and school performance for migrant-origin students and that classroom disruption mechanisms could explain this relationship, claims about causality should be made with caution because of the cross-sectional data used. The results show that migrant-origin students perform worse in their reading performance tests in schools with higher ethnic diversity than would be expected given the share of migrant-origin students. It would, however, be hard to claim that changing the ethnic composition will automatically lead to changes in the school outcomes of students or to different student behaviour.

The findings indicate that policymakers should focus not only on the share of migrant-origin students, but also on ethnic diversity. Most of the results of this thesis show comparable school performance in schools with a higher share of native-origin students for migrant-origin students, but higher math performance in schools with a higher share of native-origin students for native-origin students. Moreover, this thesis shows mostly lower reading performance in schools with higher ethnic diversity for migrant-origin students. Changing the share of migrant-origin students could lead to an increase, decrease, or no change in the school's ethnic diversity. Consequently, desegregation policies that focus only on reducing the proportion of migrant-origin students could lead to an increase of inequality between native- and migrant-origin students in schools where desegregation has led to an increase in ethnic diversity. However, for migrant-origin students as well, the effect size of the relationship between ethnic diversity and school performance is small. Policymakers should therefore be modest in their expectations of the results of desegregation policies. Changing the ethnic composition could lead possibly to only small changes in the performance of migrant-origin students.

Moreover, this study shows hardly any relationship between ethnic composition (measured by both the share of migrant-origin students and ethnic diversity) and the reading performance of native-origin students. Therefore, policies that focus on desegregation would probably not lead to negative influences on the reading performance of native-descent students due to an increase in the share of migrant-origin students in segregated schools. Moreover, native-origin parents could be informed that only the math performance and not the reading performance of their children seems threatened by an increase in migrant-origin students.

It is often argued that schools with a higher percentage of migrant-origin students suffer more from a shortage of teaching materials and of qualified teachers. Nevertheless, this study shows the opposite direction of how the share of migrant-origin students relates to the hindrance of teaching due to a shortage of qualified teachers. Consequently, influencing the ethnic composition of schools does not seem to be effective in relocating or stimulating qualified teachers to move to schools with a high share of migrant-origin students. Moreover, students in schools with higher ethnic diversity are more hindered in their learning due to a shortage of teaching materials. This finding indicates that policies should not focus on relocating to or specializing resources in schools with a higher share of migrant-origin students, but on specializing the teaching materials to the different needs of the different ethnic groups in the schools.

Students learning reading in schools with higher ethnic diversity are more hindered by disruptive behaviour during lessons. Policies could facilitate teacher training that focuses on opportunities to reduce classroom disruption caused by ethnic tensions or reduced feelings of belonging. Finally, future policies that focus on the ethnic composition of schools should not necessarily target desegregation but could focus on more general integration policies that can influence the mechanisms that explain the relationship between ethnic composition and school performance.

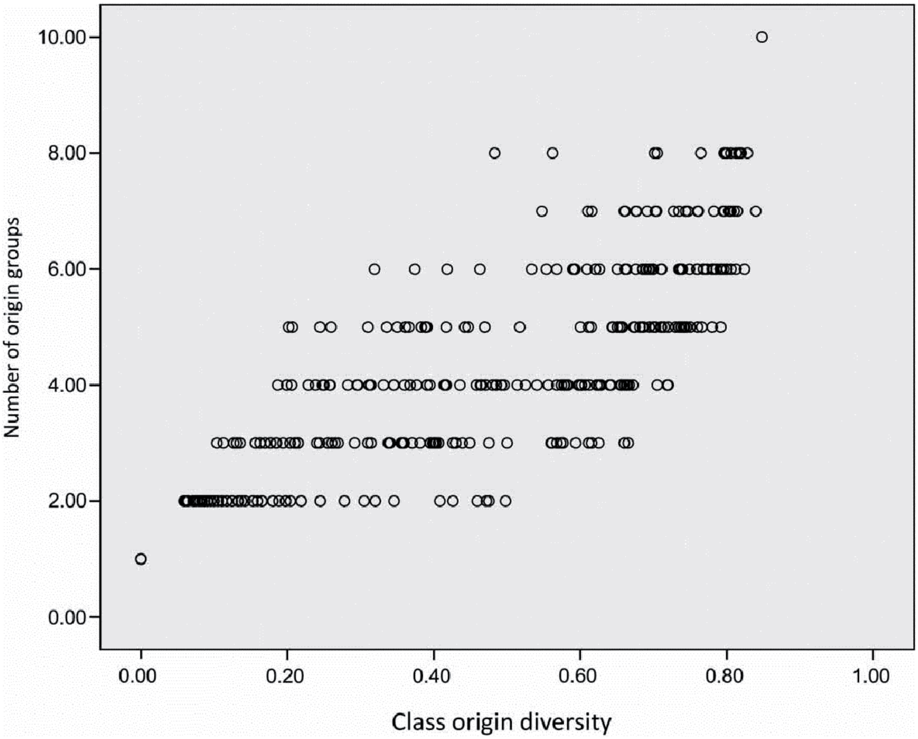
Appendices

Appendix A: Ethnic diversity, the number of origin groups and interethnic contacts

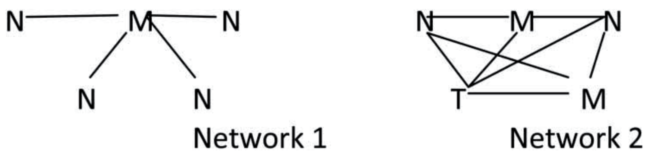
Although the number of origin groups and the ethnic diversity index are related, Figure A shows that a higher number of origin groups at class level does not necessarily lead to a higher diversity index. We computed for the native-origin students a Pearson correlation of 0.90 for ethnic diversity and the number of origin groups; therefore, ethnic diversity explains 81% of the number of origin groups. Nevertheless, there are classes with both higher and lower numbers of origin groups than we would expect due to the ethnic diversity.

To show the impact of the ethnic composition on the indexes, we calculate the four indexes of ethnic composition with 10 classes with different ethnic compositions. Networks 1 and 2 below show what we mean by the number of possible interethnic contacts, using a group of 5 students, containing 1 Moroccan student and 4 native-origin students. Moreover, Network 2 shows a group of 5 students, containing 2 native-origin students, 2 Moroccan students, and 1 Turkish student. Network 1 leads to four possible interethnic contacts and Network 2 leads to eight possible interethnic contacts.

Figure A: Class ethnic diversity and number of origin groups for native-origin students in Grade 8



SOURCE. -COOL 2008, own computation.



As Table A shows, the number of students within the different origin groups influences the height of the ethnic diversity index. Therefore, a higher number of origin groups together with a maximum number of students within every ethnic group lead to the highest ethnic diversity score. Furthermore, Table A shows that a higher ethnic diversity index leads to a higher number of possible interethnic contacts within the group. Consequently, when we use the four indexes of the ethnic composition, ethnic diversity refers to the number of possible interethnic contacts within the class. Although the number of possible interethnic contacts is dependent on the group size, a higher ethnic diversity index refers to a higher number of possible interethnic group contacts within the possibilities of the group size. In contrast to the possible number of interethnic contacts within the group, the ethnic diversity index is not dependent on the group size; therefore, we could use the ethnic diversity index to compare the influence of the possible interethnic contacts for classes with different group sizes.

Table A: Different ethnic composition scores with a school class of 20 students

% Migrant-origin	Number of ethnic groups	Ethnic diversity	Possible interethnic contacts	Native-origin	Moroccan-origin	Turkish-origin	Former Colonies-origin
50	2	0.50	100	10	10	0	0
25	2	0.37	75	15	5	0	0
5	2	0.09	19	19	1	0	0
95	2	0.09	19	1	19	0	0
65	3	0.66	133	7	7	6	0
25	3	0.40	81	15	3	2	0
10	3	0.18	37	18	1	1	0
75	4	0.75	150	5	5	5	5
30	4	0.48	96	14	2	2	2
15	4	0.27	54	17	1	1	1

Appendix B: Missing data

Table B: Means for migrant-origin students and native-origin students with and without math scores

	Grade 2				Grade 5				Grade 8			
	Migrant-origin		Native-origin		Migrant-origin		Native-origin		Migrant-origin		Native-origin	
	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing
% migrant students of class	63.22	63.25	14.37	14.31	63.67	65.24	13.35	13.97	62.75	67.06	13.90	13.97
Ethnic diversity of class	0.60	0.57	0.20	0.20	0.59	0.55	0.19	0.25	0.59	0.59	0.20	0.21
Number of origins in class	4.46	4.28	2.25	2.22	4.85	4.51	2.50	2.69	4.89	4.87	2.65	2.65
Parental education missing	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.05	0.02	0.03	0.02	0.07
Lower parental education	0.28	0.30	0.02	0.02	0.30	0.26	0.02	0.02	0.30	0.38	0.02	0.03
Lower secondary parental education	0.23	0.21	0.16	0.17	0.24	0.28	0.17	0.18	0.25	0.24	0.20	0.20
Upper secondary parental education	0.30	0.33	0.47	0.42	0.30	0.27	0.46	0.44	0.27	0.23	0.46	0.36
Tertiary parental education	0.18	0.14	0.33	0.37	0.15	0.16	0.32	0.33	0.15	0.12	0.30	0.34
Female	0.47	0.45	0.48	0.46	0.50	0.54	0.50	0.47	0.48	0.51	0.49	0.56
First-generation migrant	0.06	0.06			0.09	0.14			0.13	0.11		
Only student origin	0.33	0.34	0.01	0.01	0.25	0.29	0.004	0.003	0.26	0.31	0.003	0.004
Turkish origin	0.24	0.2			0.27	0.21			0.28	0.21		
Moroccan	0.24	0.29			0.25	0.24			0.22	0.27		
Western	0.07	0.07			0.06	0.07			0.06	0.04		
Eastern Europe	0.05	0.06			0.05	0.04			0.05	0.05		
Chinese	0.01	0.01			0.01	0.02			0.02	0.03		
Iraqi	0.03	0.02			0.02	0.02			0.02	0.02		
Afghan	0.02	0.02			0.01	0.01			0.02	0.02		
Somali	0.03	0.02			0.02	0.01			0.01	0.02		
Other country	0.20	0.19			0.18	0.19			0.16	0.18		

Table B: (Continued)

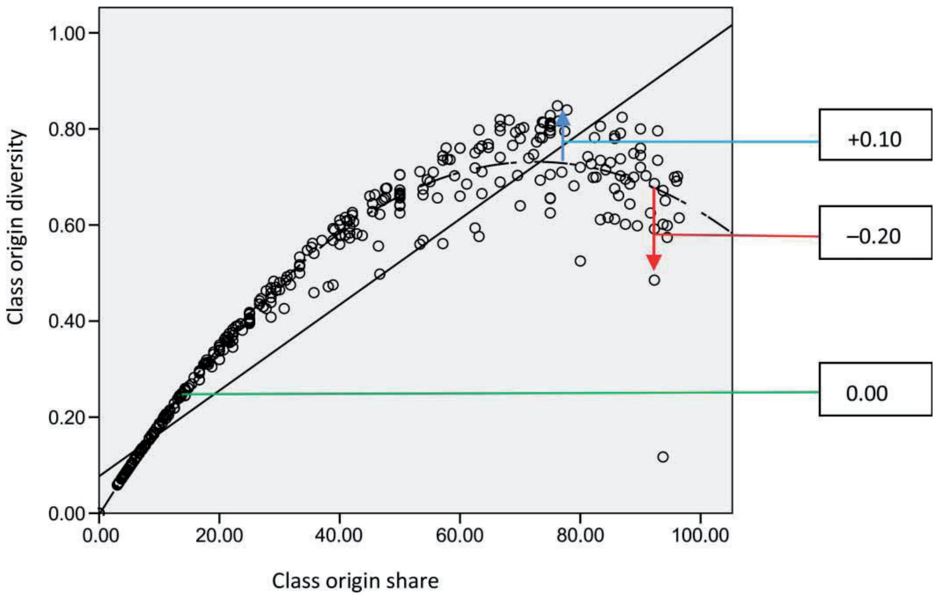
	Grade 2				Grade 5				Grade 8			
	Migrant-origin		Native-origin		Migrant-origin		Native-origin		Migrant-origin		Native-origin	
	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing	Test scores	Test scores missing
Former colony	0.12	0.12			0.13	0.19			0.15	0.17		
Math score	51.83		58.62		63.60		72.01		114.38		117.14	
N students	3462	311	9006	653	3082	281	8439	529	2742	377	7399	836
% missing test score		8%		7%		8%		6%		12%		10%

SOURCE. -COOL 2008, own computation.

Appendix C: Residualized ethnic diversity

Figure C shows a linear and quadratic regression line for ethnic diversity as a function of migrant-origin share for the native-origin students in Grade 8. The figure shows that we should explain ethnic diversity as a function of the proportion of migrant-origin children with a quadratic regression, because the quadratic line better predicts the ethnic diversity. The cases that lie independently from the quadratic line are the residuals. The residuals could be under the quadratic line and therefore negative and also above the line and therefore positive. A positive residual shows that the possible relative number of interethnic contacts is higher than the quadratic regression predicts with the given proportion of migrant-origin children. Furthermore, next to the figure we show some examples of the measurement of the distance of the ethnic diversity of the class from the regression line.

Figure C: Classmigrant-origin share and ethnic diversity groups for native-origin students in Grade 8



SOURCE. -COOL 2008, own computation.

Appendix D. Two-level multilevel analyses

Table D1: The effects of the ethnic composition on reading comprehension of students with a native-origin

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Constant	76.3**	76.3**	76.3**	30.9**	30.9**	30.9**	60.6**	60.6**	60.5**
	(0.4)	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)
Grade level	–5.7**	–5.5**	–5.4**	–3.9**	–3.7**	–3.5**	–3.2**	–3.0**	–3.0**
Proportion migrant-origin of	(0.6)	(0.6)	(0.6)	(0.9)	(0.9)	(0.9)	(1.3)	(1.3)	(1.3)
school grade									
Residualized ethnic diversity of		–14.9**			–12.0			–18.3	
school grade		(4.8)			(8.0)			(10.4)	
Proportion parents with tertiary	–0.6	–0.6	–0.4	2.0*	2.0*	2.4*	4.5**	4.6**	4.9**
Education of school grade	(0.6)	(0.6)	(0.6)	(0.9)	(0.9)	(0.9)	(1.7)	(1.7)	(1.7)
Residualized number of origin			–0.3**			–0.4**			–0.5
groups			(0.1)			(0.2)			(0.3)
Individual characteristics									
Parental education missing	–3.1**	–3.1**	–3.0**	–4.8**	–4.8**	–4.8**	–5.6**	–5.6**	–5.6**
	(1.1)	(1.1)	(1.1)	(1.2)	(1.2)	(1.2)	(1.7)	(1.7)	(1.7)
Low parental education	–6.2**	–6.2**	–6.2**	–12.9**	–13.0**	–13.0**	–15.3**	–15.4**	–15.4**
	(0.8)	(0.8)	(0.8)	(1.2)	(1.3)	(1.3)	(1.5)	(1.5)	(1.5)
Low secondary parental education	–4.4**	–4.4**	–4.4**	–9.5**	–9.5**	–9.5**	13.5**	13.5**	13.5**
	(0.3)	(0.3)	(0.3)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)
Upper secondary parental education	–2.2**	–2.2**	–2.2**	–5.7**	–5.7**	–5.7**	–7.4**	–7.4**	–7.4**
	(0.2)	(0.2)	(0.2)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)	(0.4)
Tertiary parental education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	1.4**	1.4**	1.4**	2.9**	2.9**	2.9**	3.0**	3.0**	3.0**
	(0.2)	(0.2)	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Variance									
Individual level	71.2**	71.3**	71.3**	164.4**	164.4**	164.3**	203.5**	203.4**	203.4**
	(2.1)	(2.1)	(2.1)	(4.5)	(4.5)	(4.5)	(3.4)	(3.4)	(3.4)
School level	18.3**	18.1**	18.1**	11.6**	11.5**	11.5**	22.3**	22.3**	22.1**
	(2.0)	(2.0)	(2.0)	(3.8)	(3.8)	(3.8)	(3.4)	(3.4)	(3.4)
Log likelihood	65115.1	65105.7	65104.8	64920.2	64918.0	64913.4	62141.0	62138.9	62138.8
N students	8895			8108			7568		
N schools	499			503			482		

SOURCE. - COOL 2008, own computation.
NOTE. -Standard errors between brackets.
$^{**}p < 0.01$; $^{*}p < 0.05$.

Table D2: The effects of the ethnic composition on reading comprehension of students with a migrant background

	Grade 2			Grade 5			Grade 8		
	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
Constant	67.9**	67.8**	68.1**	22.3**	22.3**	22.3**	52.1**	52.1**	52.1**
	(0.9)	(0.9)	(0.9)	(1.2)	(1.2)	(1.2)	(1.7)	(1.7)	(1.7)
Grade level									
Proportion migrant-origin of class	–0.5	–0.3	–0.3	–0.8	–0.7	–0.5	–1.7	–1.6	–1.7
	(0.7)	(0.7)	(0.7)	(1.0)	(1.0)	(1.0)	(1.6)	(1.5)	(1.5)
Residualized ethnic diversity of school		–9.1**			3.0			–16.0**	
grade		(2.4)			(2.5)			(6.0)	
Proportion parents with tertiary	2.8*	3.2**	3.6**	5.6**	5.7**	6.0**	6.3*	6.4*	6.7*
education of school grade	(1.2)	(1.2)	(1.2)	(1.7)	(1.7)	(1.7)	(2.8)	(2.8)	(2.8)
Residualized number of origin groups			–0.6**			–0.3*			–0.4
			(0.1)			(0.1)			(0.3)
Individual characteristics									
Parental education missing	–2.3	–2.2	–2.4	–4.9**	–4.9**	–4.9**	–7.3**	–7.3**	–7.4**
	(1.6)	(1.6)	(1.6)	(1.7)	(1.7)	(1.7)	(2.1)	(2.1)	(2.1)
Low parental education	–3.4**	–3.4**	–3.7**	–4.8**	–4.8**	–4.8**	–6.9**	–6.9**	–6.8**
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)
Low secondary parental education	–2.3	–2.3	–2.3	–4.6**	–4.6**	–4.6**	–7.0**	–7.0**	–7.0**
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(0.9)
Upper secondary parental education	–1.1*	–1.1*	–1.0*	–2.4**	–2.5**	–2.4**	–3.1**	–3.1**	–3.1**
	(0.5)	(0.5)	(0.5)	(0.7)	(0.7)	(0.7)	(0.9)	(0.9)	(0.9)
Tertiary parental education	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.7*	0.7*	0.7*	2.3**	2.3**	2.3**	2.6**	2.6**	2.6**
	(0.3)	(0.3)	(0.3)	(0.4)	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)
First-generation migrant	–1.8**	–1.7**	–1.7**	–2.0*	–2.0*	–2.0*	–1.4	–1.4	–1.4
	(0.7)	(0.7)	(0.7)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)
Turkish origin	–1.9**	–2.1**	–2.1**	–2.0*	–1.9*	–2.0*	–2.0*	–2.1*	–2.0*
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(0.9	(0.9	(0.9
Moroccan origin	–0.2	–0.3	–0.4	–0.2	–0.2	–0.3	0.7	0.6	0.6
	(0.5)	(0.5)	(0.5)	(0.8)	(0.8)	(0.8)	(1.0)	(0.9)	(0.9)
Western origin	4.3**	4.3**	4.2**	2.6*	2.6*	2.5*	2.8*	2.8*	2.7*
	(0.8)	(0.8)	(0.8)	(1.1)	(1.1)	(1.1)	(1.4)	(1.4)	(1.4)

Table D2: (Continued)

	Grade 2			Grade 5			Grade 8		
	Model 2	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**	**Model 2**	**Model 3**	**Model 4**
Eastern-European origin	–1.5	–1.5	–1.4	0.2	0.3	0.3	3.2*	3.2*	3.2*
	(0.8)	(0.8)	(0.8)	(1.2)	(1.2)	(1.2)	(1.4)	(1.4)	(1.4)
Chinese origin	–1.4	–1.3	–1.1	4.8*	4.8*	4.9*	4.8*	4.8*	4.9*
	(1.4)	(1.4)	(1.4)	(1.9)	(1.9)	(1.9)	(2.2)	(2.2)	(2.2)
Iraqi origin	–1.5	–1.4	–1.3	–1.5	–1.5	–1.5	0.6	0.6	0.7
	(1.0)	(1.0)	(1.0)	(1.7)	(1.7)	(1.7)	(1.8)	(1.8)	(1.8)
Afghan origin	0.0	0.0	–0.1	1.9	1.9	2.0	6.1**	6.1**	6.1**
	(1.3)	(1.3)	(1.3)	(2.1)	(2.1)	(2.1)	(2.0)	(2.0)	(2.0)
Somali origin	0.9	1.1	1.0	2.4	2.5	2.4	–0.4	–0.5	–0.5
	(1.0)	(1.0)	(1.0)	(1.7)	(1.7)	(1.7)	(2.3)	(2.3)	(2.3)
Other country origin	–0.1	–0.1	–0.1	2.6	2.6	2.5	3.3**	3.2**	3.3**
	(0.6)	(0.6)	(0.6)	(0.8)	(0.8)	(0.8)	(0.9)	(0.9)	(1.0)
Former colony origin	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Variance									
Individual level	58.8**	58.6**	58.6**	115.4**	115.4**	115.8**	176.9**	179.7**	176.6**
	(2.6)	(2.6)	(2.6)	(5.4)	(5.4)	(5.4)	(5.1)	(5.1)	(5.1)
School level	20.1**	19.9**	19.3**	17.1**	17.0**	16.5**	21.8**	20.4**	21.4**
	(2.6)	(2.6)	(2.6)	(4.8)	(4.8)	(4.8)	(3.7)	(3.6)	(3.7)
Log likelihood	24922.3	24907.4	24883.2	21404.3	21402.8	21399.9	22751.4	22744.4	22749.2
N students	3469			2773			2808		
N schools	374			378			369		

SOURCE. - COOL 2008, own computation.
NOTE. -Standard errors between brackets.
**p < 0.01; *p < 0.05.

Appendix E

Table E: Means and standard deviations for Turkish-origin students

	Total		Austria		Walloon (Bel)		Flemish (Bel)	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Indiv. level								
Math perf.	454.5	82.5	458.6	79.6	480.1	73.6	494.3	74.5
Read.perf.	439.9	84.1	425.2	84.2	470.3	84.6	485.1	70.2
High. track	0.9	0.3	0.4	0.5	0.8	0.4	0.7	0.5
ESCS	-0.8	0.9	-0.9	0.8	-0.3	0.9	-1.0	1.1
Female	0.6	0.5	0.5	0.5	0.6	0.5	0.7	0.5
First gene.	0.1	0.3	0.1	0.3	0.1	0.3	0.1	0.3
Parents mixed mar.	0.1	0.3	0.1.	0.3	0.3	0.5	0.1	0.3
Other lang. at home	0.5	0.5	0.5	0.5	0.6	0.5	0.5	0.5
Lang. at home mis.	0.2	0.4	0.3	0.5	0.0	0.0	0.3	0.5
School level								
% Native origin stud*	46.0	25.7	68.6	14.1	43.5	29.8	44.5	27.1
Resid. ethnic div.	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Mean ESCS	-0,2	0,5	-0,1	0,3	-0,2	0,5	-0,3	0,7
Prop. of Turk. ori.*	22.5	23.1	11.1	64.3	23.7	17.7	25.0	13.8
Educational System level								
% of Turk. origin*	1.3	0.6	1.3	0.0	0.4	0.0	0.4	0.0
Av. math score nat. stud.*	531.7	24.8	526.5	0.0	555.0	0.0	575.9	0.0
Early bil. labor agr.	0.4	0.5	1.0	0.0	1.0	0.0	1.0	0.0
% of Turk. origin*	41.1	20.3	76.3	0.0	67.1	0.0	65.9	0.0
Diff. Turk.Nat. mean Math	-77.3	16.3	-67.9	0.0	-74.9	0.0	-81.7	0.0
Test level								
Error math	844.2	690.6	699.8	499.2	811.5	628.8	712.8	612.2
Error Read	488.8	377.5	511.2	398.3	560.2	388.9	440.2	311.6
N students	733		66		27		29	
N schools	386		40		18		13	

Table E1: (Continued)

	Denmark		Germany		Liechtenstein		Netherlands	
	mean	SD	mean	SD	mean	SD	mean	SD
Indiv. level								
Math perf.	424.1	79.2	444.4	74.6	491.8	81.0	516.7	61.8
Read.perf.	420.1	73.8	428.5	86.5	430.6	87.5	504.7	70.6
High. track	1.0	0.0	1.0	0.0	1.0	0.0	0.3	0.5
ESCS	-0.9	0.9	-0.7	0.9	-1.0	0.7	-0.4	1.0
Female	0.6	0.5	0.5	0.5	0.2	0.4	0.6	0.5
First gene.	0.0	0.2	0.1	0.3	0.6	0.5	0.1	0.3
Parents mixed mar.	0.1	0.3	0.1	0.4	0.1	0.3	0.1	0.3
Other lang. at home	0.4	0.5	0.5	0.5	0.8	0.4	0.4	0.5
Lang. at home mis.	0.2	0.4	0.2	0.4	0.1	0.3	0.2	0.4
School level								
% Native origin stud*	36.3	25.8	50.6	22.5	26.3	7.8	56.0	31.7
Resid. ethnic div.	-0.1	0.2	0.0	0.0	0.1	0.0	0.0	0.1
Mean ESCS	-0,3	0,5	-0,2	0,5	-0.2	0.2	0.0	0.6
Prop. of Turk. ori.*	35.1	30.9	21.6	12.0	11.7	43.0	13.7	82.0
Educational System level								
% of Turk. origin*	1.0	0.0	2.0	0.0	2.3	0.0	2.3	0.0
Av. math score nat. stud.*	513.6	0.0	512.9	0.0	530.6	0.0	564.4	0.0
Early bil. labor agr.	0.0	0.0	1.0	0.0	0.0	0.0	1.0	0.0
% of Turk. origin*	20.3	0.0	43.2	0.0	23.5	0.0	68.3	0.0
Diff. Turk.Nat. mean Math	-89.5	0.0	-68.5	0.0	-38.8	0.0	-47.7	0.0
Test level								
Error math	931.7	765.2	735.6	543.6	367.7	154.7	588.7	412.4
Error Read	457.3	367.5	478.5	365.5	317.0	194.4	521.2	298.5
N students	272		141		13		52	
N schools	103		73		6		40	

Table E: (Continued)

	Vaud		St. Gallen		Schaffhausen		Bern (German)	
	mean	SD	mean	SD	mean	SD	mean	SD
Indiv. level								
Math perf.	512.3	136.0	483.7	86.8	546.3	53.8	452.9	69.4
Read.perf.	466.8	133.3	424.4	93.7	530.7	43.5	449.7	86.2
High. track	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0
ESCS	0.0	0.9	-1.0	1.2	-0.6	0.5	-0.7	0.8
Female	0.3	0.5	0.2	0.4	0.6	0.5	0.6	0.5
First gene.	0.2	0.4	0.1	0.3	0.0	0.0	0.0	0.0
Parents mixed mar.	0.2	0.4	0.4	0.5	0.1	0.4	0.3	0.5
Other lang. at home	0.7	0.5	0.4	0.5	0.4	0.5	0.5	0.5
Lang. at home mis.	0.2	0.4	0.4	0.5	0.1	0.3	0.1	0.4
School level								
% Native origin stud*	31.6	28.8	56.2	17.8	53.4	20.8	41.9	14.4
Resid. ethnic div.	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Mean ESCS	-0.1	0.3	-0.2	0.4	0.1	0.2	-0.2	0.2
Prop. of Turk. ori.*	74.1	44.2	91.1	36.6	6.7	3.0	7.1	2.0
Educational System level								
% of Turk. origin*	0.5	0.0	1.0	0.0	1.3	0.0	0.7	0.0
Av. math score nat. stud.*	548.8	0.0	582.3	0.0	587.0	0.0	563.6	0.0
Early bil. labor agr.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of Turk. origin*	36.4	0.0	54.8	0.0	51.7	0.0	50.0	0.0
Diff. Turk.Nat. mean Math	-36.5	0.0	-98.6	0.0	-40.6	0.0	-110.6	0.0
Test level								
Error math	1879.1	647.5	851.9	581.3	918.9	578.0	1132.7	826.0
Error Read	547.0	505.4	712.8	467.8	483.0	244.7	746.9	550.9
N students	6		14		14		8	
N schools	4		8		10		5	

Table E1: (Continued)

	Other German Swiss		Bern (French)		Fribourg		Zurich	
	mean	SD	mean	SD	mean	SD	mean	SD
Indiv. level								
Math perf.	477.2	81.3	448.2	58.6	507.7	48.1	464.6	86.0
Read.perf.	433.7	103.8	437.3	66.8	518.5	29.7	449.7	77.4
High. track	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0
ESCS	-0.7	0.9	-0.5	0.3	-1.1	0.7	-0.5	0.7
Female	0.2	0.4	0.6	0.5	0.8	0.4	0.5	0.5
First gene.	0.0	0.0	0.0	0.0	0.2	0.4	0.1	0.3
Parents mixed mar.	0.1	0.3	0.3	0.5	0.2	0.4	0.2	0.4
Other lang. at home	0.4	0.5	0.9	0.4	0.7	0.5	0.6	0.5
Lang. at home mis.	0.2	0.4	0.0	0.0	0.0	0.0	0.4	0.5
School level								
% Native origin stud*	60.1	21.9	48.8	8.9	55.9	7.0	42.0	13.3
Resid. ethnic div.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean ESCS	-0.1	0.4	0.1	0.2	0.2	0.2	0.0	0.3
Prop. of Turk. ori.*	9.1	6.6	3.1	7.9	2.7	1.1	7.5	3.1
Educational System level								
% of Turk. origin*	1.1	0.0	0.7	0.0	0.7	0.0	1.3	0.0
Av. math score nat. stud.*	566.7	0.0	556.0	0.0	577.9	0.0	565.0	0.0
Early bil. labor agr.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of Turk. origin*	50.0	0.0	0.0	0.0	45.5	0.0	41.0	0.0
Diff. Turk.Nat. mean Math	-89.5	0.0	-107.8	0.0	-70.2	0.0	-100.4	0.0
Test level								
Error math	1584.6	1126.6	1376.5	598.3	1059.1	1051.0	675.1	472.2
Error Read	583.6	641.0	828.8	392.2	588.7	367.0	405.2	367.0
N students	17		7		6		23	
N schools	12		4		5		14	

Table E1: (continued)

	Italian Swiss		Aargau		Neuenbrug		Geneva	
	mean	**SD**	**mean**	**SD**	**mean**	**SD**	**mean**	**SD**
Indiv. level								
Math perf.	437.8	69.3	501.5	78.7	488.8	78.4	464.2	50.1
Read.perf.	408.0	49.9	485.8	84.9	455.9	136.5	459.3	53.8
High. track	1.0	0.0	1.0	0.0	1.0	0.0	1.0	0.0
ESCS	-0.7	1.1	-0.5	0.9	-1.1	0.9	-0.6	1.0
Female	0.8	0.5	0.8	0.4	0.6	0.5	0.4	0.5
First gene.	0.0	0.0	0.1	0.3	0.6	0.5	0.1	0.4
Parents mixed mar.	0.0	0.0	0.3	0.4	0.1	0.4	0.1	0.4
Other lang. at home	0.4	0.5	0.6	0.5	0.7	0.5	0.4	0.5
Lang. at home mis.	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.0
School level								
% Native origin stud*	30.7	21.2	59.9	11.7	52.3	12.0	20.5	8.3
Resid. ethnic div.	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
Mean ESCS	-0.1	0.3	0.0	0.2	0.0	0.2	0.0	0.3
Prop. of Turk. ori.*	8.4	2.7	7.7	4.0	2.6	9.6	4.1	2.0
Educational System level								
% of Turk. origin*	0.5	0.0	1.4	0.0	0.7	0.0	0.7	0.0
Av. math score nat. stud.*	524.8	0.0	573.8	0.0	541.7	0.0	532.8	0.0
Early bil. labor agr.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% of Turk. origin*	46.7	0.0	55.6	0.0	30.0	0.0	36.4	0.0
Diff. Turk.Nat. mean Math	-87.0	0.0	-72.3	0.0	-52.9	0.0	-68.6	0.0
Test level								
Error math	1080.1	1123.4	715.0	681.4	798.1	571.1	1178.3	812.1
Error Read	529.1	491.8	396.7	269.2	715.5	472.6	494.5	385.6
N students	8		16		7		7	
N schools	7		12		6		6	

NOTE. - ESCS, economic, cultural, and social status.
*Grand mean centred in analyses

Appendix F

Table F1: Regression of the school ethnic compositions on reading scores of Turkish migrant-origin students in cross-national PISA data

	Model 1	Model 2	Model 3
Constant	412.4**	412.5**	394.5**
	(15.9)	(15.9)	(25.8)
Individual level			
ESCS	6.6**	6.6**	6.5**
	(1.9)	(1.9)	(1.9)
Higher track	63.1**	63.2**	64.1**
	(6.7)	(6.8)	(6.8)
Female	24.9**	24.9**	24.8**
	(3.3)	(3.3)	(3.3)
First generation	-1.1	-1.2	-1.1
	(5.2)	(5.2)	(5.2)
Grade	36.5**	36.5**	36.7**
	(2.9)	(2.9)	(2.9)
Parents mixed	9.6*	9.6*	9.7*
marriage	(4.9)	(4.9)	(4.9)
Other language	-10.4*	-10.4*	-10.4*
at home	(4.0)	(4.0)	(4.0)
language at	-23.8**	-23.8**	-23.7**
home missing	(4.7)	(4.7)	(4.7)
School level			
proportion native-origin stud. of	3.6	3.0	2.0
school	(12.5)	(17.4)	(17.4)
Residuals ethnic	-79.9**	-81.5*	-80.2**
diversity school	(28.3)	(42.0)	(28.3)
Proportion		-0.0	
Turkish Origin school		(0.3)	
Mean ESCS of	56.8**	56.8**	56.7**
school	(6.5)	(6.8)	(6.5)
National level			
Proportion of Turkish origin			1431.5
			(2271.5)
Average math score native students			0.9
			(1.2)
Early bilateral labor agreement			23.2
			(33.7)
Variance			
National level	1347.4	1354.9	1629.4
	(757.4)	(762.4)	(910.6)
School level	1277.7**	1281.9**	1276.7**
	(171.3)	(171.6)	(171.3)
Individual level	2958.8**	2960.9**	2961.8**
	(161.3)	(161.3)	(161.3)
Test level	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)
Log likelihood	16274.5	16274.5	16272.8

SOURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets. N countries 7, N schools 594, N students 1,461.
**p < 0.01; *p < 0.05.

Appendix G

Table G1: Robustness check

	Minus Austria	**Minus Belgium**	**Minus Denmark**
Constant	438.3**	435.7**	443.9**
	(30.1)	(33.1)	(52.0)
Individual level			
ESCS	4.3*	3.9	0.3
	(2.1)	(2.1)	(2.1)
Higher track	60.8**	62.5**	68.2**
	(8.7)	(8.1)	(6.6)
Female	-23.8**	-25.7**	-25.0**
	(3.7)	(3.5)	(3.5)
First generation	0.8	-1.6	0.7
	(6.1)	(5.5)	(5.1)
Grade	41.6**	41.0**	41.1**
	(3.3)	(3.1)	(3.0)
Parents mixed marriage	11.4**	16.0**	12.9*
	(5.4)	(5.4)	(5.0)
Other language at home	-7.9	-3.9	-8.4
	(4.4)	(4.2)	(4.4)
language at home missing	-31.4**	-27.8**	-20.3**
	(5.3)	(5.0)	(5.3)
School level			
proportion native-origin stud. of school	-18.9	-8.8	-5.1
	(14.1)	(13.1)	(14.6)
Residuals ethnic diversity school	-125.2**	-99.4**	-79.7*
	(33.3)	(27.8)	(39.6)
Proportion Turkish Origin school			
Mean ESCS of school	65.3**	57.3**	59.6**
	(7.4)	(6.8)	(7.0)
National level			
Proportion of Turkish origin	1824.6	2775.1	1265.7
	(2632.8)	(4393.3)	(3149.0)
Average math score native students	1.9	0.9	0.5
	(1.5)	(1.5)	(2.0)
Early bilateral labor agreement	12.0	16.8	14.8
	(40.6)	(50.1)	(53.1)
Variance			
National level	2165.2	2808.0	2894.5
	(1285.3)	(1655.0)	(1712.2)
School level	1115.2**	1127.5**	1319.9**
	(184.0)	(171.0)	(184.4)
Individual level	2938.1**	2846.9**	2423.4**
	(188.4)	(172.8)	(162.1)
Test level	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)
Log likelihood	12988.3	14398.5	12259.7
N students	1164	1294	1112
N schools	475	529	484
N countries	6	6	6

Table G1: (continued)

	Minus Germany	Minus Liechtenstein	Minus Netherlands
Constant	420.7**	416.2**	439.0**
	(9.9)	(38.9)	(31.5)
Individual level			
ESCS	5.0*	3.4	4.2*
	(2.1)	(1.9)	(2.1)
Higher track	72.3**	66.9**	66.4**
	(6.6)	(6.5)	(7.5)
Female	-27.4**	-26.0**	-27.1**
	(3.5)	(3.2)	(3.5)
First generation	-0.4	-0.3	4.3
	(5.5)	(5.1)	(5.5)
Grade	44.4**	42.2**	40.6**
	(3.4)	(2.8)	(3.1)
Parents mixed	16.6**	12.6**	10.7*
marriage	(5.5)	(4.8)	(5.2)
Other language	-4.0	-6.0	-8.1
at home	(4.4)	(3.9)	(4.3)
language at	-28.1**	-27.1**	-27.7**
home missing	(6.6)	(4.7)	(5.1)
School level			
proportion native-origin stud.	3.5	7.2	0.7
of school	(12.8)	(12.1)	(13.0)
Residuals ethnic	-95.8**	-108.1**	-124.9**
diversity school	(26.6)	(26.8)	(27.7)
Proportion			
Turkish Origin school			
Mean ESCS of	39.4**	54.8**	59.2**
school	(6.9)	(6.3)	(6.6)
National level			
Proportion of	2894.9**	233.4	405.4
Turkish origin	(663.6)	(3466.7)	(3311.0)
Average math	1.0**	1.1	0.7
score native	(0.2)	(1.3)	(1.4)
students			
Early bilateral	57.7**	47.4	15.7
labor agreement	(9.1)	(47.9)	(42.4)
Variance			
National level	52.2	2535.6	2511.9
	(50.7)	(1468.0)	(1482.7)
School level	1042.8**	1097.1**	1114.3**
	(171.3)	(157.6)	(171.8)
Individual level	2878.3**	2755.8**	2913.1**
	(179.4)	(159.5)	(176.6)
Test level	0.0	0.0	0.0
	(0.0)	(0.0)	(0.0)
Log likelihood	13468.2	16026.8	14451.2
N students	1213	1444	1297
N schools	495	588	522
N countries	6	6	6

SOURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets.
**p < 0.01; *p < 0.05.

Table G2: Regression of the school ethnic compositions on (A) math scores and (B) reading scores of Turkish migrant-origin students in single national PISA data

	(A)		(B)	
(A)	**Denmark**	**Netherlands**	**Denmark**	**Netherlands**
Constant	471.8** (9.1)	488.6** (14.6)	433.7** (8.7)	440.3** (13.2)
Individual level				
ESCS	13.6** (4.2)	-4.3 (4.5)	13.0** (4.1)	-0.6 (4.6)
Higher track	0.0 (0.0)	89.2** (11.5)	0.0 (0.0)	103.6** (11.4)
Female	-32.3** (7.4)	-20.7** (7.5)	22.2** (7.2)	17.4** (7.5)
First generation	7.5 (17.0)	-26.0* (12.2)	29.9 (16.5)	-20.9 (12.5)
Grade	46.5** (8.5)	51.7** (7.0)	39.8** (8.2)	45.4** (7.0)
Parents mixed marriage	21.2 (13.2)	33.8** (12.2)	13.9 (12.8)	26.8* (12.2)
Other language at home	2.7 (8.3)	7.8 (8.5)	1.8 (8.0)	3.7 (8.4)
Home language missing	-48.4** (9.6)	-17.9 (11.2)	-34.6** (9.3)	-1.8 (11.2)
School level				
proportion native-origin of school	0.1 (24.3)	0.2 (0.4)	0.2 (0.2)	73.6 (38.0)
Residuals Ethnic diversity of school	-115.5** (34.5)	189.2 (137.9)	-119.8** (31.1)	357.4** (137.3)
Proportion of Turkish origin of year				
Mean ESCS of school	38.3** (13.5)	30.3* (15.7)	45.1** (12.6)	18.7 (15.7)
Variance				
School level	662.5** (285.8)	540.3* (257.0)	475.5* (241.4)	524.8* (255.5)
Individual level	3760.8* (399.6)	1938.0 (296.3)	3639.8** (374.7)	2014.2* (298.4)
Test level	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
Log likelihood	3916.7	Not available	3889.8	Not available
N students	349	164	349	164
N schools	110	72	110	72

SOURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets.
**p < 0.01; *p < 0.05.

Appendix H

Table H1: Regression of the school ethnic compositions on math scores of selected Turkish migrant-origin students in cross-national system PISA data

	Model 3	
Constant	389.5**	(32.1)
Individual level		
ESCS	7.6**	(2.9)
Higher track	58.3**	(12.2)
Female	-24.2*	(4.8)
First generation	-12.7	(8.2)
Parents mixed marriage	18.7*	(7.9)
Other language at home	-1.9	(5.8)
Home language missing	-33.3**	(6.9)
School level		
proportion natives of school	9.0	(17.0)
Residuals Origin diversity of school	-115.6**	(35.2)
Proportion of Turkish origin of school		
Mean ESCS	64.7**	(9.3)
Cross-national level		
Selection effect	2.3*	(1.1)
Proportion of Turkish origin	2685.3	(1835.6)
Average math score native students	0.9	(0.7)
Early bilateral labor agreement	-55.1	(48.1)
Variance		
Country level	801.5	(476.8)
School level	1085.2**	(250.1)
Individual level	3090.1**	(267.6)
Log likelihood	8280.4	
N students	739	
N schools	391	
N countries	7	

SOURCE. – PISA 2009, own computation.
NOTE. –Standard errors between brackets.
**p < 0.01; *p < 0.05.

Appendix I

Table I: Bayesian results of the school ethnic compositions on country grand classroom disruption in cross-national PISA data

	Model 1a			Model 1b			Model 2			Model 3		
	B	95% CI		B	95% CI		B	95% CI		B	95% CI	
Constant	-0.03	-0.10	0.03	-0.03	-0.10	0.04	-0.06	-0.15	0.04	-0.06	-0.16	0.05
School level												
percentage immigrants of school	-0.00	-0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	-0.00	0.00
Residuals Ethnic diversity of school	0.68*	0.33	1.02	0.83*	0.45	1.21	0.83*	0.46	1.21	0.82*	0.41	1.20
Mean ESCS	-0.12*	-0.15	-0.09	-0.09*	-0.12	-0.05	-0.09*	-0.12	-0.06	-0.09*	-0.12	-0.06
Variation ESCS	0.36	-0.12	0.84	0.32	-0.21	0.83	0.31	-0.23	0.84	0.31	-0.24	0.85
percentage females of school	-0.00*	-0.00	-0.00	-0.00*	-0.01	-0.00	-0.00*	-0.01	-0.00	-0.00*	-0.01	-0.00
Educational system level												
GDP							0.00	-0.00	0.00	0.00	-0.00	0.00
MIPEX							0.00	-0.00	0.00	0.00	-0.01	0.00
MIPEX*Resid. Diversity										-0.04*	-0.08	-0.01
Variance												
Country level	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
School level	0.12*	0.11	0.12	0.12*	0.12	0.13	0.12*	0.12	0.13	0.12*	0.12	0.13
DIC	2.447.10			2.172.15			2.170.05			2.170.34		
N countries	20			16								
N schools	3533			2962								

SOURCE: PISA 2009. Own computation.
0 not in 95% CI.

Appendix J:

Table J: Maximum Likelihood results of the school origin compositions on classroom disruption in weighted cross-national PISA data

	Model 1a		Model 1b		Model 2		Model 3	
	B	SE	B	SE	B	SE	B	SE
Constant	-0.35**	0.09	-0.31**	0.10	-0.48**	0.14	-0.48**	0.14
School level								
percentage immigrants of school	-0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residuals Origin diversity of school	0.64**	0.22	0.69**	0.24	0.69**	0.24	0.64**	0.22
Mean ESCS	-0.10**	0.04	-0.08*	0.04	-0.08*	0.04	-0.08*	0.04
Variation ESCS	1.32**	0.50	1.21*	0.52	1.21*	0.51	1.21*	0.50
percentage females of school	-0.00**	0.00	-0.01**	0.00	-0.01**	0.00	-0.01**	0.00
Educational system level								
GDP					0.00	0.00	0.00	0.00
MIPEX					0.00	0.00	0.00	0.00
MIPEX*Resid. Diversity							-0.03	0.02
Variance								
Country level	0.04**	0.01	0.04**	0.01	0.03**	0.01	0.03	0.01
School level	0.10**	0.01	0.10**	0.01	0.10**	0.01	0.10	0.01
Log Likelihood	2.975.21		2.584.44		2.581.94		2.578.60	
N countries	20		16					
N schools	3533		2962					

SOURCE. -PISA 2009. Own computation.
**p<0.01; *p<0.05.

Appendix K

Table K1: The effects of the school ethnic compositions and explanatory variables on reading performance of native-origin students in the cross-national PISA data

	Model 1	
	B	SE
Constant	401.35	4.34
Proportion of native-origin students	4.72	4.07
Residuals ethnic diversity	-13.75	25.39
Destination country fixed model	yes	yes
School level	693.44	24.14
Individual level	4330.83	24.57
Deviance Information Criterion	732668.42	

SOURCE. -PISA 2009, own computation.
NOTE. -We control at the individual level for ESCS. non-vocational orientation, grade, female, single mother. At the school level, we control for mean ESCS, variation ESCS, proportion of females and proportion of single parents.
N schools 2897. N students 64,976
**p < 0.01; *p < 0.05.

Appendix L: Control variables

Gender is a dummy variable that is coded 1 for 'female'.

Parental ESCS is a composite index from PISA regarding the parents' occupational status. the parents' educational level and the presence of any material or cultural resources in the students' homes.

Non-vocational orientation is coded 1 for the students that have no vocational orientation in their schooling.

Grade. As not all students in our sample attend the same grade, we include a variable to account for this. Due to between-country variance in the way grades are constructed, we standardise grades based on the modal grade in a country.

First generation. Using the information on student's country of birth and parental birth country, we construct a dummy variable. We define first-generation migrants as students who were born outside the destination country, just as at least one of their parents was.

Single mother is a dummy variable that is coded 1 for students who indicated that they usually only live with their mother.

Destination country language primary language is coded 1 for children that indicated that they use the destination country language as the primary language at home. As we lack data on the language at home for 19.9 percent of the students, we include the dummy 'language at home missing'.

Parents' Mixed Marriage. Using the information on parents' country of birth, we construct a dichotomous variable. We define mixed-marriage parents as those where one partner was born abroad and the other was born in the country of destination. As we lack data on the parents' mixed marriage for 2.1 percent of all students. we include the dummy 'mixed marriage missing'.

The mean ESCS was computed using the ESCS score of all students in each school.

Variation in ESCS. We calculated the coefficient of variation in ESCS by dividing the standard deviation in ESCS within the school by the school-level mean ESCS.

Proportion of females. We computed the proportion of females using the number of female students in the school.

Proportion of students from single-parent families was computed using the number of students in the school that usually live only with their father or mother.

Appendix M

Table M1: Effects of the school ethnic compositions and explanatory variables on reading performance of migrant-origin students in the cross-national PISA data

	Model 4	
	B	**SE**
Constant	404.48	6.18
Proportion of native-origin students	8.11	4.49
Residuals ethnic diversity	-34.19	17.77
Qualified teacher shortage	-3.02	1.29
Materials shortage	-0.82	1.01
Classroom disruption country centred	-14.26	2.27
Destination country fixed	yes	
Origin country region fixed	yes	
School level	665.02	37.86
Individual level	4389.46	44.94
Deviance Information Criterion	241249.65	

SOURCE. -PISA 2009, own computation.
NOTE. -We control at the individual level for ESCS, non-vocational orientation, grade, female, single mother, first generation, destination country language, destination country language missing, mixed marriage and mixed marriage missing. At the school level we control for mean ESCS, variation ESCS, proportion of females and proportion of single parents.
N schools 2708, N students 21,333
**p < 0.01; *p < 0.05.

Appendix N

Table N1: Bayesian results of the school ethnic compositions on reading performance of migrant-origin students in the cross-national PISA data

	Model 1		
	B	95% CI	
Constant	417.95	406.59	429.54
Proportion of native-origin students	6.84	-2.48	15.48
Residuals ethnic diversity	-45.18*	-80.27	-10.04
Variance			
Country level	1082.31*	521.57	2132.64
Origin-country level	95.90*	54.56	158.24
School level	703.43*	628.14	785.40
Individual level	4359.52*	4270.90	4448.14
Deviance Information Criterion	240603.93		

NOTE. -We control at the individual level for ESCS, non-vocational orientation, grade, female, single mother, first generation, destination country language, destination country language missing, mixed marriage and mixed marriage missing. At the school level we control for mean ESCS, variation ESCS, proportion of females and proportion of single parents.
N countries 18, N origin countries 76, N schools 2708, N students 21,333.
SOURCE. -PISA 2009, own computation.
* = 0 not in 95 percent CI.

Appendix O

Table O1: Proportion of native-origin students and reading performance of migrant-origin students – Random-effects generalized least squares (GLS), ordinary least squares (OLS) and Instrumental Variable two-stage least squares (IV 2SLS) estimates with city as the instrument in the cross-national PISA data

	Model 1		**Model 2**		**Model 3**	
	Random-effects GLS		**OLS**		**IV 2SLS**	
	B	**SE**	**B**	**SE**	**B**	**SE**
Proportion of native-origin students	8.29	4.77	1.64	5.43	-9.87	12.27
Ethnic diversity	-43.43*	19.65	-21.20	21.28	-34.27	20.15
Destination country fixed effect	yes		yes		yes	
Origin region fixed effect	yes		yes		yes	
R-squared	0.45		0.45		0.45	
					1st stage:	
					B	**SE**
City					-0.17	0.01
F test (p-value)					138.16	(0.00)

SOURCE. -PISA 2009, own computation.
NOTE. -Robust standard errors clustered by school in Model 2 and 3.
We control for constant, ESCS, non-vocational orientation, grade, female, single mother, first generation, destination country language, destination country language missing, mixed marriage, mixed marriage missing, mean ESCS, variation ESCS, proportion of females, proportion of single parents controls.
N schools 2708, N students 21,333.
** p < 0.01; *p < 0.05.

Appendix P

Table P1: Standardized effect sizes of the relationship between the ethnic composition and school performance for migrant-origin and native-origin students.

		Migrant-origin		Native-origin	
		Maths performance	Reading performance	Maths performance	Reading performance
PISA 2009	Proportion of native-origin students	0.05	0.02	0.04*	0.01
	Ethnic diversity	-0.04*	-0.02*	-0.01	-0.00
PISA 2012	Proportion of native-origin students	0.05	0.02	0.03*	0.00
	Ethnic diversity	-0.02	-0.03*	-0.01*	0.01

Appendix Q

Table Q1: Standardized effect sizes of the share of native-origin students on the dependent variables for native-origin students

Dataset	Group	Math performance	Reading performance	Disruptive behaviour	Chapter
COOL 2008	Grade 2, the Netherlands	0.06*	0.10*		2
COOL 2008	Grade 5, the Netherlands	0.07*	0.02*		2
COOL 2008	Grade 8, the Netherlands	0.06*	0.08*		2
PISA 2009	15-year-olds, 18 European countries	0.04*	0.01	-0.04	5
PISA 2012	15-year-olds, 18 European countries	0.03*	0.01	-0.09*	5

NOTE. - *p < 0.05.

Table Q2: Standardized effect sizes of the share of native-origin students on the dependent variables for migrant-origin students

Dataset	Group	Math performance	Reading performance	Disruptive behaviour	Chapter
COOL 2008	Grade 2, Netherlands	0.04	0.03		2
COOL 2008	Grade 5, Netherlands	0.07*	0.00		2
COOL 2008	Grade 8, Netherlands	0.04	-0.04		2
PISA 2009	15-year-olds, 18 European countries	0.05	0.02	-0.02	5
PISA 2012	15-year-olds, 18 European countries	0.05	0.02	-0.11*	5
PISA 2009	15-year-olds of Turkish descent in seven countries	-0.02	0.01		3
PISA 2009	15-year-olds of Turkish descent in Denmark	0.00	0.05		3
PISA 2009	15-year-olds of Turkish descent in the Netherlands	0.08	0.29		3

NOTE. - *p < 0.05.

A

Summary

Ethnic school composition, school performance and classroom behaviour in Western societies

Introduction

This thesis focuses on the relationship between ethnic composition and both schooling outcomes and classroom behaviour, making the crucial distinction between the share of migrant-origin students and ethnic diversity. Ethnic school composition is seen as one of the explanations for the inequality of school performance between native- and migrant-origin students in Western societies. Although the use of the concept migrant origin is contested concept, the relationship between ethnic school composition and school performance is of interest to policymakers and social scientists in both the United States and Europe.

Most social scientists and policymakers who target ethnic school composition only focus on the share of migrant-origin students. However, a few scholars have recently started to differentiate between the share of migrant-origin students and ethnic diversity using an inverted Herfindahl index (Dronkers 2010; Maestri 2011a; Van Houtte and Stevens 2009) to take the variability of origin countries within schools into account. Whereas the share of migrant-origin students takes into account the relative proportion of all migrant-origin students compared to native-origin students, ethnic diversity takes into account the numbers and relative sizes of all the different ethnic groups. Consequently, a high share of migrant-origin students refers to greater opportunity for contact with migrant-origin students and less opportunity for contact with native-origin students. Nevertheless, students in a school with higher ethnic diversity have higher opportunities for interethnic contacts in school than students in schools with lower ethnic diversity.

The current educational literature shows mixed results for the relationship between ethnic diversity and school performance and lacks information on the relationship between ethnic diversity and student behaviour during lessons. Therefore, this thesis first answers the following research question: What are the relationships between the sub-dimensions of the ethnic composition (share of migrant-origin students and ethnic diversity) and school performance, and disruptive behaviour in schools in Western societies?

Ethnic diversity and the share of migrant-origin students could imply different mechanisms to explain the relationship between ethnic composition and school performance. Whereas ethnic diversity emphasizes mechanisms that arise due to the higher relative opportunity for interethnic contacts, a higher share of native-origin students refers to mechanisms that emphasize the influence of a higher opportunity for contacts with native-origin students. Sykes and Kuyper (2013) mention three clusters of interrelated mechanisms that could explain the relationship between ethnic composition and school performance: (1) teaching mechanisms, (2) organizational mechanisms, and (3) peer-group mechanisms. It is unclear whether these explanatory mechanisms actually occur in practice and how relatively important they are, because they have barely been empirically studied. Therefore, this thesis addresses the following second research question: To what extent can teaching, organizational, and peer-group mechanisms explain the relationship between ethnic composition (share of native-origin students and ethnic diversity) and school performance?

Because differentiation between ethnic diversity and the share of migrant-origin students in a research model is relatively new, the relationship between ethnic diversity and school performance is only known for a selected group of Western countries (Dronkers 2010; Maestri 2011a). The two studies that differentiate between the share of migrant-origin students and ethnic diversity and focus on school performance show opposite findings. Differences in the relationship between ethnic diversity and school performance across countries could be driven by institutional differences between these countries. For instance, destination countries differ in their policies enhancing the integration of migrants and their descendants (Heath and Cheung 2007). More inclusive integration policies can partly explain the differences in the relationship between ethnic diversity and student disruptive behaviour across countries by reducing tensions between the different ethnic groups (Esser 2004) and, thus meeting the conditions of contact theory at the institutional level (Pettigrew 1998). This argument gives rise to the third research question: To what extent does the relationship between ethnic diversity (net of the share of migrant-origin students) and student disruptive behaviour differ across countries due to integration policies?

Chapter 2

Ethnic composition of the class and educational performance in primary education in the Netherlands

The relationship between ethnic diversity and school performance seems to differ across different age stages (Dronkers 2010; Maestri 2011b). This could be because peer-group effects increase as pupils get older (Van Ewijk and Sleegers 2010a). In this chapter, I investigate the relationship between ethnic composition and school performance in different age stages of primary education in the Netherlands and focus on possible problems of multicollinearity that could occur when research tries to differentiate ethnic composition between ethnic diversity and the share of migrant-origin students.

Chapter 2 shows high variance inflation factors (VIFs) if both ethnic diversity and the share of migrant-origin students are included in one research model. These VIFs indicate that the standard errors of ethnic diversity and the share of migrant-origin students on school performance are inefficient due to problems of multicollinearity.

Therefore a research model has been employed that empirically distinguishes ethnic diversity from the share of migrant-origin students. In this research model, I calculate the residualized ethnic diversity on the share of migrant-origin students. The use of residualization offers a solution to the problem of multicollinearity. Residualized ethnic diversity is conceptualized as ethnic diversity given the share of migrant-origin students. High residualized ethnic diversity refers to greater opportunity for interethnic contact than is expected given the share of migrant-origin students in the school. With residualization, the diversity index is uncorrelated with the share of migrant-origin students. Therefore, the results for the share of migrant-origin students could be seen as more comparable to those of studies that do not include ethnic diversity in their research model.

The analyses were carried out using the 2008 wave from the Cohort Research on Educational Careers (Cohort Onderzoek Onderwijsloopbanen, or COOL). The COOL dataset contains information on the country of origin of the students and their parents, the social economic background of the students, and their test scores from school performance tests developed by the Dutch national testing agency. Given the nested structure of the data, with individual pupils nested in classes, which are nested in schools, multilevel analysis with three levels was used.

The results demonstrate that the proportion of migrant-origin students in a class is negatively related to the academic performance of native-origin pupils and not significantly related to most of the academic performance of migrant-origin students. The diversity indicator, which indicates the level of diversity given a particular share of migrant-origin children, is negatively related to reading comprehension in eighth grade. For the other grades, little support is found for the negative effects of diversity net of the share of migrant-origin students in a class.

The previous study of Maestri (2011a) that focuses on ethnic diversity and school performance in the Netherlands, using another research design and older Dutch primary school data (*Primair onderwijs en special onderwijs cohortonderzoeken*, or PRIMA), shows the positive effects in higher grades of ethnic diversity on math scores (Maestri 2011a). A possible clarification for the difference in findings is that, in the PRIMA data, some origin countries are old European migration countries, such as like Spain, Italy, Greece, and Portugal, and in the recent COOL data these origin categories are replaced by new migration countries, such as Iraq, Afghanistan, Somalia, and a new European migration country, Poland. Due to the cultural distances with higher ethnic diversity in the new COOL data, one could expect this diversity to lead to more problems in ethnic identification and interethnic conflicts than for the PRIMA ethnic diversity index, which mostly refers to ethnic school compositions with students of mostly European and Mediterranean origin.

The non-significant findings in the lower grades and the significant findings of a relationship between ethnic diversity and reading comprehension provide support among migrant-origin students that ethnic peer-group influences also increase as students get older.

Chapter 3

Ethnic composition and school performance in the secondary education of Turkish migrant-origin students in seven countries and 19 European educational systems

The influence of ethnic composition on school performance can differ between origin country groups. Turkish-descent students are particularly interesting because earlier studies have shown strong ties to Turkish migrant networks at both the country and school levels (Fennema and Tillie, 1999; Van der Veen and Meijnen, 2001; Van Heelsum 2005). According to social capital theory, stronger relationships with one's own ethnic group lead to a bonding social capital advantage due to the sharing and exchange of resources. Therefore, higher chances of co-ethnic contacts and access to positive ethnic social capital in a school with a higher proportion of Turkish students could be expected. Furthermore, both parents and students have a greater chance of acquiring bonding capital outside school in a country with a higher proportion of co-ethnics. Turks comprise the largest immigrant group in Europe and have settled in a large number of European countries (Crul and Vermeulen, 2003). Strong relationships with one's own ethnic group could lead to more interethnic tensions in schools with higher ethnic diversity. Such tensions negatively influence school performance (Hoxby 2000).

Chapter 3 focuses on how ethnic composition is associated with the school performance of 15-year-old Turkish-descent students in different European countries or educational systems, using the cross-national Programme for International Student Assessment (PISA) 2009 and the 2009 Swiss PISA Plus survey datasets. The PISA datasets contain information on the origin country of 15-year-old students and their parents, the social economic backgrounds of the students, and the students' scores from school performance tests developed by PISA. Use of the Swiss PISA Plus data provided the opportunity to study the results in 19 European educational systems, in addition to the seven countries.

At the school level, our results show no effect of the proportion of native-origin students or the proportion of co-ethnics and a negative association between ethnic diversity (given the proportion of migrants) and math performance. Moreover, the results demonstrate no significant association between social capital variables at the national or educational system level and math performance. Robustness checks for Denmark and the Netherlands show clearly inverted results regarding the influence of ethnic diversity. The data from Denmark showed strong negative associations between ethnic diversity and school performance, while the data from the Netherlands revealed positive relations between ethnic diversity and test scores.

Chapter 3 showed no evidence of bonding social capital advantages due to higher proportions of co-ethnics in school or the educational system or evidence of a social capital advantage due higher proportions of native-origin students in school. The negative relationship between ethnic diversity and the math performance of Turkish-origin students is an indication of possibly more interethnic barriers in schools with higher ethnic diversity that accompany the greater opportunities for possible interethnic contact. The inverted results in Denmark and the Netherlands underpin the fact that, despite similarities in the functioning of European educational systems, there are also national differences between European countries and their ethnic composition effects.

Chapter 4

The relationship between ethnic diversity and classroom disruption in the context of integration policies

Esser (2004) argues that increased interethnic contact could lead to increased interethnic tension. These tensions could lead to more incidents of disorder during lessons. However, the relationship between ethnic composition and classroom disorder could differ across different countries. From a contact hypothesis perspective, countries with more inclusive integration policies can be expected to support with their authority positive intergroup contacts at the institutional level. Furthermore, the rights that a country provides its immigrants is an indication of the dominant norms regarding the equality of ethnic groups in that country. Therefore, the relationship between ethnic diversity and classroom disorder could be weaker in countries with a more inclusive integration policy.

The relationship between ethnic composition and classroom disruption is studied using PISA 2009 data from 20 different Western countries for which data are available on the origin countries of students' parents. An indicator of classroom disruption was developed using information from a number of answers of students referring to perceived disruptive behaviour during math lessons. The Migrant Integration Policy Index (MIPEX) is used as an indicator of country policies differences that influence equality between different migrant groups, migrant-origin groups, and native-origin students. MIPEX is available for 16 of the 20 countries.

The results show a positive association between ethnic diversity net of the migrant-origin share and classroom disruption and a non-significant relationship between the share of migrant-origin students and classroom disruption. Furthermore, the study shows a negative interaction term between migration policy and ethnic diversity. Consequently, students perceive more classroom disruption in more ethnically diverse schools, but this relationship is weaker in countries with a more inclusive integration policy.

The findings partly support the contact hypothesis in an educational context. Countries with more inclusive integration policies possibly support positive intergroup contacts with their authority (Pettigrew, 1998) at the school level.

Chapter 5

Why is ethnic composition related to school performance? The relevance of teaching, school organizations, and peer groups

Differentiation in the conceptualization of ethnic composition between the share of native-origin students and ethnic diversity provides the opportunity disentangle the three different mechanisms that explain the relationship between the ethnic composition of schools and school performance (Sykes and Kuyper 2013).

Classes with a higher share of migrant-origin students require, from the teaching mechanism perspective, teachers who are able to cater to the needs of migrant-origin students (Peetsma et al. 2006). Moreover, students in schools with a high proportion migrant-origin students, could especially suffer due to the organizational mechanism of a shortage of educational instruction resources. Furthermore, a lower proportion of native-origin students is linked to the peer-group mechanism of a loss of bridging capital that migrant-origin students can acquire from native-origin students (Driessen 2002).

The relationship between ethnic diversity and school performance is explained in particular through peer-group and teaching mechanisms: Different ethnic groups can enrich the classroom through differences in ideas (Lazear 1998; Maestri 2011a). Moreover, it is argued that higher ethnic diversity provides stronger incentives to orient toward or adapt to the dominant culture. However, higher ethnic diversity can also lead to more tensions between different groups because the students need to cross more possible ethnic barriers (Esser 2004). Migrant-origin students in classrooms with greater ethnic diversity are more able to understand the teaching, which is often dominated by the dominant culture (Maestri 2011a), but teachers need to adapt their teaching to a greater variety of migrant-group needs (Dronkers and Van der Velden 2013).

The mechanisms that explain the relationship between ethnic composition and reading performance are studied using PISA 2009 data from 18 European countries. The shortage of qualified reading teachers is used as an indicator for teaching mechanisms and the shortage of materials as an indicator for organizational mechanisms. Moreover, classroom disorder is used as an indicator of peer-group mechanisms.

The study shows a non-significant association between the proportion of native-origin students and reading performance for both migrant- and native-origin students. The relationship partly intensifies for migrant-origin students when a *teaching mechanism* (qualified teacher shortage) is included. A total of 3 percent of the negative impact of ethnic diversity on reading performance for migrant-origin students is explained by shortages of materials and 21 percent by classroom disorder.

Although less hindrance to learning due to a lack of qualified teachers in schools with a higher proportion of native-origin students was expected, the results show that the principals of schools with a higher proportion of native-origin students perceive greater levels of hindrance to learning due to a lack of qualified teachers. This teaching mechanism could explain a small part of the positive association between the share of native-origin students and reading performance. The partial explanation of the relationship between ethnic diversity and reading performance by classroom disorder provides support regarding intercultural tensions or lower feelings of belonging in schools with a higher ethnic diversity.

Conclusion

This thesis shows non-significant relationships between the share of native-origin students and school performance for migrant-origin students, but significant positive relationships between the share of native-origin students and math performance for native-origin students. Causal interpretations of the relationship between ethnic composition and school performance should be made with caution. The results of the instrumental variable approach that uses urbanization as an instrument for the share of native-origin students indicates that the relationship between the share of native-origin students and school performance is overestimated in a multilevel design that is not instrumentalized.

The results shows hardly any negative relationships between ethnic diversity and school performance for native-origin students, mostly negative relationships between ethnic diversity and reading performance, and mixed findings for the relationship between ethnic diversity and math performance for migrant-origin students. Moreover, robustness checks show that the significance of the relationship between ethnic diversity and the school performance of migrant-origin students in the PISA 2009 cross-national study is driven mostly by Greece and Denmark. Finally, the results show that the effect size for the relationship between ethnic composition and school performance is mostly small, as for most school-level variables.

The shortage of qualified teachers partly explains the positive relationship between the share of native-origin students and reading performance and the shortage of teaching materials partly explains the relationship between ethnic diversity and school performance, but not the relationship between the share of native-origin students and reading performance for migrant-origin students. Moreover, classroom disruption partly explains the negative relationship between ethnic diversity and reading performance for migrant-origin students.

The significant positive relationship between ethnic diversity and classroom disruption during reading lessons is weaker in countries with a more inclusive integration policy. Consequently, students in countries with a more inclusive integration policy are less harmed by the relationship between ethnic diversity and classroom disruption during reading lessons.

The findings of this dissertation indicate that both policymakers and social scientists who focus on ethnic school composition should not only focus on the share of migrant-origin students but also on ethnic diversity. Teachers in schools with high ethnic diversity could focus on creating a less disruptive climate to give their students more effective learning time to achieve higher reading performances. The four conditions of the contact hypothesis could provide ideas to reduce interethnic tensions and reinforce a positive working climate. The relationship between ethnic diversity and classroom disruption is weaker in countries with a more inclusive integration policy. Therefore, this study shows how inclusive integration policies relate to the everyday relations of both native- and migrant-origin students in ethnically diverse schools and to the goals of multiculturalism policies. Finally, inclusive integration policies indirectly provide students in ethnically diverse schools more opportunities to work on their reading performance through a decline of classroom disruption.

S

Samenvatting

Etnische schoolcompositie, schoolprestaties en gedrag in de klas in westerse maatschappijen

Introductie

Dit proefschrift richt zich op de relatie tussen etnische compositie aan de ene kant en schoolprestaties gedrag in het klaslokaal aan de andere kant, waarbij het cruciale onderscheid wordt gemaakt tussen het percentage leerlingen met een migratieachtergrond en etnische diversiteit. De etnische schoolcompositie wordt gezien als een van de verklaringen voor ongelijkheid van onderwijsprestaties tussen leerlingen met en zonder een migratieachtergrond in westerse maatschappijen. Hoewel het gebruik van het concept “migratieachtergrond” discutabel is, is er zowel in de Verenigde Staten als in Europa, zowel bij beleidsmakers als bij sociale wetenschappers, interesse in de relatie tussen etnische schoolcompositie en schoolprestaties.

De meeste sociale wetenschappers en beleidsmakers die zich richten op etnische schoolcompositie richten zich alleen op het percentage leerlingen met een migratieachtergrond. Een paar wetenschappers zijn echter recent gestart met het maken van een onderscheid tussen het percentage leerlingen met een migratieachtergrond en etnische diversiteit. Ze gebruiken daarvoor een omgekeerde Herfindahl index (Dronkers 2010; Maestri 2011a; Van Houtte, en Stevens 2009) om rekening te houden de verscheidenheid van herkomstlanden in de school. Waar het percentage leerlingen met een migratieachtergrond rekening houdt met de relatieve grootte van het aantal leerlingen met een migratieachtergrond vergeleken met de leerlingen zonder een migratieachtergrond, houdt etnische diversiteit rekening met het aantal en de relatieve omvang van alle verschillende etnische groepen op een school. Hierdoor correspondeert een hoog percentage leerlingen met een migratieachtergrond met een grotere kans op contacten met leerlingen met een migratieachtergrond en een lagere kans op contacten met leerlingen zonder een migratieachtergrond in de school. Leerlingen in een school met een hogere etnische diversiteit hebben daarentegen een grotere kans op interetnische contacten in de school in vergelijking tot leerlingen in een school met een lagere etnische diversiteit.

De huidige literatuur geeft een diffuus beeld wat betreft de relatie tussen etnische diversiteit en schoolprestaties en geeft geen informatie over de relatie tussen etnische diversiteit en leerlingengedrag tijdens de lessen. Daarom wil dit proefschrift allereerst de volgende onderzoeksvraag beantwoorden: Wat is de relatie tussen de subonderdelen van de etnische compositie (percentage leerlingen met een migratieachtergrond en etnische diversiteit), en schoolprestaties en verstorend gedrag in scholen in westerse maatschappijen?

Etnische diversiteit en het percentage leerlingen met een migratieachtergrond kunnen verschillende mechanismen impliceren die de relatie tussen etnische compositie en schoolprestaties verklaren. Daar waar etnische diversiteit de nadruk legt op mechanismen die voortkomen vanuit de grotere kans op interetnische contacten, verwijst het percentage leerlingen met een migratieachtergrond naar mechanismen die een nadruk leggen op een grotere kans op contacten met leerlingen zonder een migratieachtergrond. Sykes en Kuyper (2013) benoemen drie clusters van samenhangende mechanismen die de relatie tussen de etnische compositie en schoolprestaties kunnen verklaren: (1) onderwijsmechanismen, (2) organisatiemechanismen en (3) peergroepmechanismen. Het is onduidelijk of deze mechanismen plaatsvinden in de praktijk en wat het relatieve belang van de mechanismen is, aangezien de mechanismen nauwelijks bestudeerd zijn. Daarom wil dit proefschrift de volgende (tweede) onderzoeksvraag beantwoorden: In welke mate kunnen onderwijs-, organisatie- en peergroepmechanismen de relatie tussen etnische compositie (percentage leerlingen zonder migratieachtergrond en etnische diversiteit) en schoolprestaties verklaren?

Omdat het onderscheid tussen etnische diversiteit en het percentage leerlingen met een migratieachtergrond in één onderzoeksmodel relatief nieuw is, is deze relatie alleen bekend voor een geselecteerd aantal westerse landen (Dronkers 2010; Maestri 2011a). De twee studies die een onderscheid maken tussen het percentage leerlingen met een migratieachtergrond en etnische diversiteit en die zich richten op onderwijsprestaties vinden tegenovergestelde uitkomsten. Verschillen in de relatie tussen etnische diversiteit en schoolprestaties kunnen gedreven worden door institutionele verschillen tussen deze landen. Bijvoorbeeld bestemmingslanden verschillen in hun beleid ten aanzien van het verbeteren van de integratie van migranten en hun nakomelingen (Heath, en Cheung 2007). Meer inclusief integratiebeleid kan ten dele het verschil tussen de relatie etnische diversiteit en wanordegedrag van leerlingen verklaren, vanwege de reductie van spanningen tussen verschillende etnische groepen (Esser 2004) en daardoor te voldoen aan de voorwaarden van de contacttheorie op institutioneel niveau (Pettigrew 1998). Dit leidt tot de derde onderzoeksvraag: In welke mate verschilt de relatie tussen etnische diversiteit (gegeven het percentage leerlingen met een migratieachtergrond) en wanordelijk gedrag van leerling tussen landen vanwege de integratiebeleid?

Hoofdstuk 2

Etnische compositie van de klas en onderwijsprestaties in het primair onderwijs in Nederland

De relatie tussen etnische diversiteit en schoolprestaties lijkt te verschillen tussen verschillende leeftijdsfases (Dronkers 2010; Maestri 2011b). Dit kan komen door het sterker worden van peergroepeffecten wanneer kinderen ouder worden (Van Ewijk, en Sleegers 2010a). In dit hoofdstuk onderzoek ik de relatie tussen etnische compositie en schoolprestaties in verschillende leeftijdsfases van het primair onderwijs in Nederland en richt ik mij op mogelijke problemen van multicollineariteit die kunnen ontstaan wanneer onderzoek binnen de etnische compositie een onderscheid probeert te maken tussen etnische diversiteit en het percentage leerlingen met een migratieachtergrond.

Hoofdstuk 2 toont hoge variantie-inflatiefactoren (VIFs) wanneer zowel etnische diversiteit als het percentage migratieachtergrondleerlingen in één onderzoeksmodel worden gebruikt. Deze VIF-waarden geven een aanwijzing dat de standaardfouten van onderzoeksmodellen die etnische diversiteit en het percentage leerlingen met een migratieachtergrond combineren inefficiënt zijn vanwege problemen van multicollineariteit. Daarom is een ander onderzoeksmodel gebruikt dat empirisch onderscheid maakt tussen etnische diversiteit en het percentage leerlingen met een migratieachtergrond. In dit onderzoeksmodel is de geresidueerde etnische diversiteit op het percentage leerlingen met een migratieachtergrond berekend. Het gebruik van residueren biedt een oplossing voor het probleem van multicollineariteit. De geresidueerde etnische diversiteit valt te conceptualiseren als de etnische diversiteit gegeven het percentage leerlingen met een migratieachtergrond. Een hoge geresidueerde etnische diversiteit wijst op een grotere kans op interetnische contacten dan valt te verwachten gezien het percentage leerlingen met een migratieachtergrond in de school. Met het residueren is de diversiteitsindex niet gecorreleerd met het percentage leerlingen met een migratieachtergrond. Hierdoor zijn de resultaten van het percentage leerlingen met een migratieachtergrond meer vergelijkbaar met studies die etnische diversiteit niet aan hun onderzoeksmodel toevoegen.

De analyses zijn uitgevoerd met gebruik van de eerste ronde van het Cohort Onderzoek Onderwijsloopbanen (COOL) uit 2008. De COOL-dataset bevat informatie over het herkomstland van de leerlingen en hun ouders, de sociaal-economische achtergrond van de leerlingen en de testscores van de schoolprestatiestesten die ontwikkeld zijn door het nationale Nederlandse toetsinstituut. Vanwege de geneste structuur van de data, met individuen die genest zijn in klassen, die weer genest zijn in scholen, zijn multilevelanalyses met drie niveaus uitgevoerd.

De resultaten lieten voor leerlingen zonder een migratieachtergrond een negatieve relatie zien tussen het percentage leerlingen met een migratieachtergrond in een klas en academische prestaties en geen significante relatie tussen het percentage leerlingen met een migratieachtergrond en academische prestaties voor leerlingen met een migratieachtergrond. De diversiteitsindicator, die het niveau van diversiteit gegeven een specifiek percentage leerlingen met een migratieachtergrond aangeeft, hangt voor leerlingen met een migratieachtergrond in groep 8 negatief samen met scores op het domein begrijpend lezen. Voor de andere groepen zijn er geen onderbouwingen gevonden voor negatieve effecten van diversiteit gegeven het percentage leerlingen met een migratieachtergrond.

De eerdere studie van Maestri die zich richtte op etnische diversiteit en schoolprestaties in Nederland en die een ander onderzoeksdesign en oudere Nederlandse schooldata (Primair onderwijs en speciaal onderwijs cohortonderzoek, PRIMA) gebruikte, liet in hogere groepen positieve effecten van etnische diversiteit op rekenscores zien (Maestri 2011a). Een mogelijke verklaring voor het verschil in uitkomsten kan zijn dat in het PRIMA databestand sommige herkomstlanden oude Europese migratielanden zijn zoals Spanje, Italië, Griekenland en Portugal, terwijl in het recente COOL-databestand deze categorieën voor landen vervangen zijn door nieuwe migratielanden zoals Irak, Afghanistan, Somalië en een nieuw Europees migratieland: Polen. Het valt te verwachten dat vanwege de compositie van de culturele afstanden met een hogere herkomstdiversiteit in het nieuwe COOL-databestand, deze diversiteit kan leiden tot meer problemen van etnische identificatie en interetnische conflicten dan bij de PRIMA herkomstdiversiteitsindex, die vooral verwijst naar etnische schoolcomposities met leerlingen met vooral een Europese en mediterrane herkomst.

De niet-significante bevindingen in de lagere groepen en de significante bevinding van een relatie tussen etnische diversiteit en begrijpend lezen geeft voor leerlingen met een migratieachtergrond een onderbouwing dat ook etnische peergroepinvloeden toenemen wanneer studenten ouder worden.

Hoofdstuk 3

Etnische schoolcompositie en schoolprestatie van leerlingen met een Turkse achtergrond in secundair onderwijs in zeven landen en in 19 Europese onderwijssystemen

De invloed van de etnische compositie en schoolprestaties kan verschillen tussen groepen uit verschillende herkomstlanden. Leerlingen met een Turkse achtergrond zijn met name interessant, omdat eerdere studies sterke verbindingen binnen Turkse herkomstnetwerken op zowel land- als schoolniveau hebben laten zien (Fennema en Tillie 1999; Van der Veen en Meijnen 2001; van Heelsum 2005). Volgens de sociaal-kapitaaltheorie leiden sterkere verbindingen met de eigen etnische groep tot verbindende sociaal-kapitaal voordelen vanwege het delen en uitwisselen van bronnen. Daarom kan een grotere kans op contacten met leden van dezelfde etnische groep en toegang tot etnisch sociaal kapitaal verwacht worden in scholen met een hoger percentage studenten met een Turkse achtergrond. Daarnaast hebben zowel ouders als leerlingen een grotere kans om verbindend sociaal kapitaal te vergaren in een land met een hoger percentage leden van de eigen etnische groep. Turken zijn de grootste migrantengroep in Europa en hebben zich gesetteld in een groot aantal Europese landen (Crul, en Vermeulen 2003). Sterke banden met de eigen etnische groep kunnen leiden tot meer interetnische spanningen in scholen met een hogere etnische diversiteit. Deze spanningen beïnvloeden de schoolprestaties negatief (Hoxby 2000).

Het derde hoofdstuk richt zich op de vraag hoe de etnische schoolcompositie samenhangt met de schoolprestaties van 15-jarige studenten met een Turkse achtergrond in verschillende Europese landen of onderwijssystemen. Hierbij werd de 2009-ronde van het cross nationale PISA (Programma voor Internationale Leerlingen Beoordeling) en het Zwitserse PISA-plus databestand gebruikt. Het PISA-databestand bevat informatie over de herkomstlanden van 15-jarige leerlingen en hun ouders, de sociaal-economische achtergrond van de studenten en testscores van schoolprestatietesten die ontwikkeld zijn door PISA. Door daarnaast de Zwitserse PISA-plus te gebruiken, had ik de mogelijkheid om naast de zeven landen, 19 Europese onderwijssystemen te bestuderen.

Op schoolniveau laten de resultaten geen effect zien van het percentage leerlingen zonder een migratieachtergrond of het percentage leerlingen met dezelfde etnische achtergrond op rekenprestaties. Ze laten een negatieve samenhang tussen etnische diversiteit (gegeven het percentage leerlingen een migratieachtergrond) en rekenprestaties zien. Bovendien, tonen de resultaten geen significante relatie tussen het percentage personen met dezelfde etnische achtergrond op nationaal of onderwijssysteemniveau met rekenprestaties. Robuustheidstesten voor Denemarken en Nederland laten duidelijk tegenovergestelde resultaten zien wat betreft etnische diversiteit en schoolprestaties. De data uit Denemarken laten sterke negatieve samenhangen zien van etnische diversiteit en schoolprestaties, terwijl de data uit Nederland positieve relaties tussen etnische diversiteit en testscores onthullen

Hoofdstuk drie toont geen bewijs voor verbindend sociaal kapitaalvoordelen vanwege een hoger percentage leden van de eigen etnische groep in de school of in het onderwijssysteem, of bewijs voor sociaal-kapitaalvoordeel vanwege een hoger percentage leerlingen zonder een migratieachtergrond in de school. De negatieve relatie tussen etnische diversiteit en rekenprestaties voor leerlingen met een Turkse achtergrond is een aanwijzing voor het bestaan van mogelijke interetnische barrières in scholen met een hogere etnische diversiteit die ontstaat vanwege een grotere mogelijkheid van potentiële interetnische contacten. De tegenovergestelde resultaten voor Denemarken en Nederland onderstrepen dat ondanks overeenkomsten in het functioneren van Europese onderwijssystemen, er ook nationale verschillen zijn tussen Europese landen en hun etnische compositie-effecten.

Hoofdstuk 4

De relatie tussen etnische diversiteit en wanorde in de klas in de context van integratiebeleid

Esser (2004) stelt dat een toename van interetnisch contact kan leiden tot een toename van interetnische spanningen. Deze spanningen kunnen leiden tot wanorde-incidenten tijdens de lessen. De relatie tussen de etnische compositie en wanorde in de klas kan echter verschillen tussen landen. Vanuit het perspectief van de "contact hypothesis" kan verwacht worden dat landen met een meer inclusief integratiebeleid met hun autoriteit op institutioneel niveau positieve contacten tussen etnische groepen stimuleren. Daarnaast zijn de rechten die landen geven aan hun migranten een indicatie van de dominante normen met betrekking tot gelijkheid tussen etnische groepen in dat land. De relatie tussen etnische diversiteit en wanorde in de klas kan daarom zwakker zijn in landen met een meer inclusief integratiebeleid.

De relatie tussen etnische compositie en wanorde in de klas is bestudeerd met PISA 2009-data uit 20 verschillende westerse landen waar de herkomstlanden van de ouders van de studenten bekend zijn. Een indicator voor wanorde in de klas is ontwikkeld door gebruik te maken van antwoorden van studenten die gaan over het ervaren wanordelijk gedrag tijdens de lessen begrijpendlezen. De MIPEX (Immigranten Integratiebeleid indEX) is gebruikt als een indicator voor integratiebeleid verschillen tussen landen die de rechten tussen migranten en personen met en zonder een migratieherkomst beïnvloeden. De MIPEX is beschikbaar voor 16 van de 20 landen.

De resultaten lieten een positieve samenhang tussen etnische diversiteit -gegeven het percentage leerlingen met een migratieachtergrond en wanorde in de klas zien en een niet significante relatie tussen het percentage leerlingen met een migratieachtergrond en wanorde in de klas. Daarnaast toonde de studie een negatieve interactie tussen het integratiebeleid en etnische diversiteit. Leerlingen ervaren dus meer wanorde in de klas in scholen met een hogere etnische diversiteit, maar deze relatie is kleiner in landen met een meer inclusief integratiebeleid.

De bevindingen ondersteunen ten dele de "contact hypothesis" in een onderwijscontext. Landen met een meer inclusief integratiebeleid ondersteunen mogelijk met hun autoriteit positief de contacten tussen verschillende groepen.

Hoofstuk 5

Waarom is er een relatie tussen etnische compositie en onderwijsprestaties? De relevantie van onderwijs, schoolorganisatie en peergroep

Het onderscheid tussen het "percentage leerlingen zonder een migratieachtergrond" en "etnische diversiteit" geeft mogelijkheden om de drie verschillende mechanismen die de relatie tussen de etnische schoolcompositie en onderwijsprestaties (Sykes en Kuyper 2013) te ontwarren.

Klassen met een hoog percentage leerlingen met een migratieachtergrond hebben vanuit het onderwijsperspectief leerkrachten nodig die in staat zijn om tegemoet te komen aan de behoeften van leerlingen met een migratieachtergrond (Peetsma e.a. 2006). Daarnaast kunnen leerlingen in scholen met een hoog percentage leerlingen met een migratieachtergrond in het bijzonder lijden onder het organisatorische mechanisme van een tekort aan onderwijsmaterialen. Bovendien wordt een lager percentage van leerlingen zonder een migratieachtergrond gelinkt aan een peergroepmechanisme van een verlies aan overbruggend sociaal kapitaal dat leerlingen met een migratieachtergrond kunnen verwerven van leerlingen zonder een migratieachtergrond (Driessen 2002).

De relatie tussen etnische diversiteit en schoolprestaties wordt vooral verklaard door peergroepmechanismen en onderwijsmechanismen: verschillende etnische groepen kunnen de klas verrijken door verschillende ideeën en voorkennis (Lazear 1998; Maestri 2011a). Daarnaast wordt gesteld dat een hogere etnische diversiteit sterkere prikkels geeft tot aanpassing aan de dominante cultuur. Een hogere etnische diversiteit kan echter ook leiden tot meer spanningen tussen verschillende groepen, omdat de leerlingen meer mogelijke etnische barrières moeten overbruggen (Esser 2004). Leerlingen met een migratieachtergrond in klassen met een hogere etnische diversiteit kunnen het onderwijs dat vaak gedomineerd wordt door de dominante cultuur beter begrijpen (Maestri 2011a), maar de leerkrachten moeten bij een hogere diversiteit hun onderwijs aanpassen aan een grotere verscheidenheid aan behoeften van de leerlingen vanwege de verschillende herkomstgroepen.

De mechanismen die de relatie tussen de etnische compositie en prestaties op het domein begrijpend lezen verklaren, zijn bestudeerd met PISA 2009-data uit 18 Europese landen. Het tekort aan gekwalificeerde begrijpend lezendocenten is gebruikt als een indicator van onderwijsmechanismen. Het tekort aan instructiematerialen is gebruikt als een indicator van organisatiemechanismen. Daarnaast is de wanorde in de klas gebruikt als een indicator van peergroepmechanismen.

De studie liet een niet-significante samenhang tussen het percentage leerlingen zonder een migratieachtergrond en begrijpend lezenprestaties zien voor zowel leerlingen met als zonder een migratieachtergrond. De relatie wordt voor leerlingen met een migratieachtergrond sterker wanneer een onderwijsmechanisme (tekort aan gekwalificeerde leerkrachten) wordt toegevoegd. Voor leerlingen met een migratieachtergrond wordt 3 procent van de negatieve impact van etnische diversiteit op begrijpend lezenprestaties verklaard door een tekort aan instructiematerialen en 21 procent door wanorde in de klas.

Hoewel in scholen met een hoger percentage leerlingen zonder een migratieachtergrond minder hinder van een tekort van gekwalificeerde leerkrachten werd verwacht, laten de resultaten zien dat directeuren van scholen met een hoger percentage leerlingen zonder een migratieachtergrond zelfs een grotere hinder ervaren op het leren door een tekort aan gekwalificeerd leerkrachten. Dit onderwijsmechanisme kan een deel van de positieve samenhang tussen het percentage leerlingen zonder een migratieachtergrond en begrijpend lezenprestaties verklaren. De gedeeltelijke verklaring van de relatie tussen etnische diversiteit en begrijpend lezenprestaties door wanorde in de klas geeft een onderbouwing ten aanzien van interculturele spanningen of afgenomen gevoelens van het erbij horen in scholen met een hogere etnische diversiteit.

Conclusie

Dit proefschrift liet geen significante relaties tussen het percentage leerlingen zonder een migratieachtergrond en schoolprestaties voor leerlingen met een migratieachtergrond zien, maar significant positieve relaties tussen het percentage leerlingen zonder een migratieachtergrond en rekenprestaties voor leerlingen zonder een migratieachtergrond. Causale interpretaties van de relatie tussen de etnische compositie en schoolprestaties moeten met voorzichtigheid worden gemaakt. De resultaten van een instrumentele variabelebenadering waarbij de urbanisatie als instrument voor het percentage leerlingen zonder een migratieachtergrond wordt gebruikt gaf een indicatie dat de relatie tussen het percentage leerlingen zonder een migratieachtergrond en schoolprestaties is overschat in een "multilevel design" waarbij niet gebruik is gemaakt van een instrumentele variabele.

De resultaten lieten nauwelijks negatieve relaties zien tussen etnische diversiteit en schoolprestaties voor leerlingen zonder een migratieachtergrond, maar voor leerlingen met een migratieachtergrond vooral negatieve relaties tussen etnische diversiteit en begrijpend lezenprestaties en wisselende resultaten voor de relatie tussen etnische diversiteit en rekenprestaties. Daarnaast lieten robuustheidstesten zien dat de significantie van de relatie tussen etnische diversiteit en schoolprestaties in de cross-nationale studie vooral gedreven wordt door Griekenland en Denemarken. Tenslotte lieten de resultaten zien dat de effectgrootte van de relatie tussen etnische compositie en schoolprestaties –zoals voor de meeste schoolniveauvariabelen- meestal klein is.

Een tekort aan gekwalificeerde leerkrachten verklaart voor leerlingen met een migratieachtergrond ten dele de positieve relatie tussen het percentage leerlingen zonder een migratieachtergrond en begrijpend lezenprestaties. Onderwijsmaterialen verklaren ten dele de relatie tussen etnische diversiteit en schoolprestaties en niet de relatie tussen het percentage leerlingen zonder een migratieachtergrond en begrijpend lezenprestaties. Verder verklaart wanorde in de klas voor de leerlingen met een migratieachtergrond ten dele de negatieve relatie tussen etnische diversiteit en begrijpend lezenprestaties.

De significante positieve relatie tussen etnische diversiteit en wanorde in de klas tijdens lessen begrijpend lezen is kleiner in landen met een meer inclusief integratiebeleid. Daarom zijn leerlingen in landen met een meer inclusief integratiebeleid op zijn minst minder geschaad door de relatie tussen etnische diversiteit en wanorde in de klas tijdens de begrijpend lezenlessen.

De uitkomsten van dit proefschrift geven een indicatie dat zowel beleidsmakers als sociale wetenschappers die zich richten op de etnische schoolcompositie zich niet alleen moeten richten op het percentage leerlingen met een migratieachtergrond, maar ook op de etnische diversiteit. Leerkrachten in scholen met een hogere etnische diversiteit kunnen zich richten op het creëren van een klassenklimaat met minder wanorde, om zo de leerlingen meer effectieve leertijd te geven waardoor zij hogere resultaten op het domein begrijpend lezen kunnen behalen. De vier condities uit de contact theorie kunnen ideeën geven voor het verminderen van interetnische spanningen en voor het versterken van een positief werkklimaat. De relatie tussen etnische diversiteit en wanorde in de klas is zwakker in landen met een inclusief integratiebeleid. Daarom laat deze studie zien hoe inclusief integratiebeleid een relatie heeft met de alledaagse relaties van zowel kinderen met en zonder een migratieachtergrond in etnisch diverse scholen en met de doelen van multicultureel beleid. Tenslotte geeft inclusief integratiebeleid in etnisch diverse scholen door een afname van de wanorde in de klas indirect meer kansen om te werken aan hun begrijpend lezenprestaties.

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