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Does regional ethnic diversity moderate the negative effect of school ethnic diversity on educational performance?

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Abstract
This paper address the question whether ethnic diversity in school classes in the context of major cities and metropolises, where children from an early age grew up with the phenomenon of ethnic diversity, has a positive effect on the educational performance of migrant pupils. We use PISA 2006 data with 8,521 immigrant students from 35 origin countries, living in 15 destination countries, and all 72,329 native students in these countries. Native students and students with an immigrant background have been analyzed separately, using a multilevel analysis. We find that the effect of school ethnic diversity outside cities is quite negative on the educational performance of migrant and native pupils. In cities the effect of school ethnic diversity is smaller but still negative for both migrant and native pupils. But in large cities the effect of school ethnic diversity on educational performance is positive for both migrant and native pupils.

Background
Urban studies show that ethnic diversity in cities and neighborhoods can trigger a reaction of hunkering down that leads to a decrease in trust and social capital of both in-group and out-groups (Putnam, 2007), not only in the USA but also in continental Europe (Lance & Dronkers, 2011). Whether the so-called constrict hypothesis of Putnam also applies for schools that are located in a multi-ethnic metropolis still remains to be seen. The question we would like to answer in this article is therefore: *Does ethnic diversity in school classes in the context of major cities and metropolises, where children from an early age grew up with the phenomenon of ethnic diversity, have a positive effect on the educational performance of migrant pupils, taking the ethnic composition of those classes into account?*

This question is in line with the expectation that Putnam expresses in his article. However, he only does so in the final section of that article, which bears the ominous title ‘Becoming Comfortable with Diversity’. This final section is related to the future. His expectation of a positive correlation between diversity and social capital contradicts his earlier drawn conclusions on the present. He states: "(...) my hunch is that at the end we shall see that the challenge [that immigration and diversity pose to social capital and solidarity] is best met not by making 'them' like 'us', but rather by creating a new, more capacious sense of 'we', a reconstruction of diversity that does not bleach out ethnic specificities, but creates overarching identities that ensure that those specificities do not trigger the allergic, 'hunker down' reaction" and that “in the short run there is a trade-off between diversity and community, but that over time wise policies (public and privately) can ameliorate that trade-off“ (Putnam, 2007: 163-164). Our proposition is that within a context in which ethnic diversity has become an accepted or, phrased differently, a “normal” phenomenon from birth on, this optimistic expectation for the future of Putnam could indeed become true.

We are not the only or first ones to propose that conditions might moderate the relationship between neighborhood diversity and neighborhood trust. Laurence (2011), Stolle, Soraka, & Johnston (2008) and Gorny & Torunczyk-Ruiz (2014) shows that individual experience with ethnic diversity or the existence of bridging ties between ethnic groups moderate the relationship between neighborhood diversity and neighborhood attachment. Sturgis, Brunton-Smith, Kuha, & Jackson (2013) found another important moderator: the age-cohort. In their study of London neighborhoods, they found that the effects of ethnic diversity and segregations among the youngest adults weaken over successive cohorts. This moderating effect of age on the association between ethnic diversity and social cohesion for white residents provides further evidence in support of the idea that growing up in a multi-cultural society in which ethnic minorities play a visible and positive role services to shift the attitudes and behaviours of younger ethnic majority cohorts in pro-social directions. Stolle and Harell (2012) found in Canada that youth socialization experiences with rising diversity and the normalization of diversity in a multicultural environment could contribute to beneficial effects of diverse social networks.

Earlier research on school ethnic diversity

The relationship between the ethnic school composition and pupils' achievement is of growing interest to European researchers (Agirdag, Van Houtte, & Van Avermeat, 2012). Recent studies use beside the *ethnic share* also *ethnic diversity* as an extra indicator of the ethnic school composition (Braster & Dronkers, 2013; Dronkers & Van der Velden, 2013; Maestri, 2011; Veerman, Van de Werfhorst, & Dronkers, 2013). Ethnic diversity refers to the composition in the school in terms of the number and size of different ethnic groups.

Researchers propose both positive and negative mechanisms that explain the relation between the ethnic school composition and school performances. First it has been argued that a higher proportion of migrants can lead to lower educational performances due to lowering the standards (Rosenthal and Jacobsen, 1968), or due to insufficient contact with the destination language. Second a higher share of ethnic students may positively influence the educational performances of migrant students, because schools and teachers are likely to specialize to the needs of the ethnic minority students (Peetsma, Van der Veen, Koopman, & Schooten, 2006). Third, high proportions of migrants may negatively relate to educational outcomes, due to fewer access to social structures from which social 'bridging' capital can be acquired (Cheng, Martin, & Werum, 2007; Crosnoe, Cavanagh, & Elder Jr., 2003). *Ethnic diversity* measures this part of the ethnic composition, because ethnic diversity refers to the composition in the school in terms of the number and size of different ethnic groups and to the relative number of interethnic contacts. Consequently, this variable is one of the indicators for the influence of the ethnic group size of the different ethnic groups, but also of the relative possible number of ties outside the peer group. Whereas Dronkers and Van der Velden (2013) and Veerman et al. (2013) have found that ethnic diversity leads for migrant students to lower school performances, Maestri (2011) and Braster and Dronkers (2013) demonstrate a positive relationship between ethnic diversity and school performances in The Netherlands (c.f. for an explanation of the differences Braster & Dronkers, 2013; Maestri, 2011; Veerman et al., 2013).

Braster and Dronkers (2013) explain their positive outcome with the Rotterdam context, where pupils from an early age grew up with the phenomenon of ethnic diversity. In this paper we use the international dataset of PISA 2006 to test their hypothesis that not only ethnic diversity in Rotterdam but also regional diversity on a much larger scale can moderate the negative effect of school ethnic diversity on educational performance. In other words, just like the moderating effect of bridging ties between ethnic groups and age-cohorts for the strength of relationship between neighborhood diversity and neighborhood attachment or

trust, we assume that regional diversity and the “normality” of ethnic diversity is a moderator for the relation between school ethnic diversity and educational performance.

Hypothesis

Thus, in this paper these two strands of literature are combined in a cross-national analysis. *Our hypothesis is that ethnic diversity in secondary schools can have a positive effect on the educational performance of migrant and/or native students, but only in the context of a multi-ethnic metropolis.* In the context of a big city youngsters will consider ethnic diversity as something "normal" contrary to their parents that can show reactions of hunkering down. In ethnic diverse schools in big cities students can bridge their ethnic differences by sharing a common urban culture and street language which increases their levels of trust and collaboration, resulting in better educational performance.

Data

For this chapter, we have used the 2006 version of the PISA. Since 2000, 15-year-old students living in a large number of OECD member-states have been taking this test every three years. The purpose of this test is to map competencies in the fields of mathematics, physics, and reading at the end of the compulsory education period (at the age of 16 or 17 in most Western countries). The focus of PISA 2006 is on sciences; the test also measured the students’ reading and math skills (OECD, 2007).[1] The PISA data for each participating country constitute a representative sample of the schools that teach 15-year-old students. Each school that has been selected tests a sample of all 15-year-olds, irrespective of their level or grade. In addition to educational performance, PISA also supplies information on a large number of characteristics pertaining to individual background and school. The school principals provide details on a variety of school characteristics, such as student-teacher ratio, teacher shortages, and the location of the school. In the student questionnaires, students are asked for information on such things as the sociocultural status of their parents, the availability of resources at home, the language spoken at home, and the country in which their parents were born. Considering that the information on the country of origin of both parents is crucial for the two research questions, we can only include countries that provide sufficient specific information on these countries of birth. Although no fewer than 57 countries took part in PISA 2006, only the following 15 Western countries provided this information: Australia, Austria, Belgium, Denmark, Finland, Germany, Greece, Latvia, Liechtenstein, Luxembourg, New Zealand, Norway, Portugal, Scotland, and Switzerland.[2] In order to determine students’ country of origin, several decision rules have been used based on their own birth country and the birth countries of their parents. Next to the students’ country of birth, we identified his/her immigrant status, derived from the birth countries of both parents. Students of whom at least one of the parents was born in a country outside the country of the test were identified as immigrants.

PISA data contain two cross-national indicators of the track the students are attending. The student is asked whether he or she is currently enrolled in a certain track of a certain level. This was later recoded in the international format, distinguishing between general and

[1] The results for mathematics and language basically are not different, but in the case of language skills, they are more pronounced for students with an immigrant background (for obvious reasons).

[2] The relevant question was not asked in a similar way in all countries. The question was to indicate a limited number of countries of birth, based on the main immigrant groups in the country concerned (e.g., in the German questionnaires, possible countries of birth were: Russia, the former Yugoslavia, Greece, Italy, Poland, and Turkey, while the Scottish questionnaire listed the options as China, India, the Middle East, Africa, the Caribbean, and Europe).

vocational tracks on the one hand, and between lower and higher tracks on the other (see Dronkers, Van der Velden, & Dunne, 2011).

Schools are the sampling unit in the PISA survey. These schools, however, often contain both general and vocational education, and both levels within secondary education. The school level therefore reflects more the administrative unit of the educational institution, while the combined two-track characteristics reflect more the daily reality of the teaching and learning environment, as well as the social interactions between students and teachers. This daily life unit is a better indicator of the actual school environment of teaching and learning than is the administrative unit. We compute this new school level per country for each student by combining his or her school identification number, the kind of track he or she is following (vocational or general), and the track level (lower or higher). Dronkers, Van der Velden, and Dunne (2011) offer a detailed description of the result of this redefinition of school environment from an administrative unit into the daily life unit of teaching and learning. In order to avoid extreme results for combinations with few cases, we deleted all combinations of school identification number, vocational or general education, and the track level, which had less than six students (natives and immigrants) per school.

The analysis was based on 8,521 immigrant students from 35 different countries of origin, living in 15 Western destination countries, in 60 regions, attending 1,960 schools, and all 72,329 native students in these 15 Western countries, in 60 regions, attending 3,311 schools. We refer to previous publications for a detailed description of the data and the coding of all variables (Dronkers, Van der Velden, & Dunne, 2011).

PISA data are unique as cross-national data, but they are only cross-sectional and not longitudinal data. This sets limits to the conclusions, which we can draw from these data. With cross-sectional data, we can only establish associations or relationships between variables (for instance between a school characteristic like ethnic diversity and educational performance of the pupils), but cannot rule out whether this association is not caused by an other variable, earlier in the career of the pupil (for instance the quality of primary education in these societies). Although we use a terminology, which suggests causation, the readers should be aware that we couldn't prove causality with the cross-sectional international data at hand.

Variables

The variables used are shown in Tables 1 and 2, separated for students with an immigrant background and native students. The variables were coded similarly for both categories of students, with the immigrant characteristics (such as the country of origin) being irrelevant for native students.

[about here tables 1 and 2]

Dependent variable: scientific literacy

The dependent variable in this study is *scientific literacy*. To measure linguistic skills accurately would make the test too long to be feasible. Hence, we created a large number of very similar but shorter tests. Because such different tests can never offer exactly the same degree of difficulty, Item Response Modeling (IRM) was used to achieve comparable results between students who took different tests. In this analysis, we averaged the five plausible values that were obtained from the IRM and used that result as the dependent variable. The linguistic skills scores were standardized for the OECD countries using an average of 500 and a standard deviation of 100. The mean scores of the students with an immigrant background per country of origin and destination are given in Table 2.

We include the *measurement error* of the five plausible values on science test as one of the error terms of the regression.[3] This procedure is sometimes called the *Known Variance Approach* (also used in meta-analyses, which apply multi-level techniques). This known measurement error approach results in a more reliable estimation of the true score of the dependent variable and thus more correct parameters of the independent variables (see Hox, 2002, chapter 8; Raudenbush & Bryk, 2002). The results of multilevel analyses with this measurement model are comparable to results using all the plausible values and averaging the coefficients.

Characteristics of individuals

In line with Rumbaut (2004), we have distinguished *generations* based on the countries of origin of both parents and child, and the age at which the child immigrated. Second-generation immigrant students are students with at least one parent who was born abroad, while the student was born in the destination country. Students who belong to the first generation were themselves born abroad.

Having one native parent is a dummy variable indicating whether students had one native and one immigrant parent (1) or two immigrant parents (0; reference category).

Home language is a dummy variable indicating whether the child speaks the country's official language at home (yes 1; no 0).

Regional origin of students with an immigrant background: Based on earlier analyses of PISA 2003 data (Levels & Dronkers, 2008; Levels et al., 2008), we combined the countries of origin in five regions of origin to simplify the presentation of the analysis: *Eastern Europe* (Albania, Belarus, Bosnia, Croatia, Czech Republic, Estonia, Hungary, Macedonia, Poland, Rumania, Russia, Serbia, and Montenegro, Slovakia, Slovenia, Ukraine); *non-Islamic Asia* (China, India, Korea, Philippines, Vietnam); *Islamic countries* (Albania, Bangladesh, Bosnia, Morocco, Pakistan, Turkey); *Western OECD countries* (Australia, Austria, Belgium, Denmark, France, Germany, Greece, Italy, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States); *Sub-Sahara Africa* (Cape Verde, Congo, South Africa).

The *parental sociocultural status* is based on the index of economic, social, and cultural status of the parents (ESCS). It is a composite measure created by the OECD based on the occupational status of the parents (ISEI scale (International Socio-economic Index for Occupational Status; Ganzeboom, De Graaf, Treiman, & De Leeuw, 1992), the educational level of the parents (ISCED; International Standard Classification of Education, UNESCO, 2006), and the presence of any material or cultural resources at the students' homes.[4] This combination of the parents' occupational status and educational level, together with the resources at home, produces the strongest indicator of the parental environment. We set the average of this index of ESCS of the parents for all destination countries and all students to zero, to ensure that the comparisons for this variable show the result for the average student in a destination country.

Grade. Considering that not all students were at the same level or in the same grade at the time of the PISA survey, we have used the "grade" variable to account for this. The average of this grade variable was set to zero for all destination countries and all students to ensure that the comparisons for this variable show the result for the student at the average level of 15-year-olds.

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[3] Computation of measurement error of the dependent variable is done with this formulae: $[(MP-P1)^2 + (MP-P2)^2 + (MP-P3)^2 + (MP-P4)^2 + (MP-P5)^2]/5$. MP= average 5 plausible values and P1 to P5 are the plausible values.

[4] The measure consists of the presence of a desk, a private room, a quiet place to study, a computer, educational software, Internet access, literature or poetry, art, books that may be of use when doing schoolwork, a dictionary, a dishwasher, and the presence of more than 100 books in the house.

Female. Dummy for gender (female 1; male 0).

Curriculum at the school level

Vocational. A dummy variable indicates whether a student is currently enrolled in a (pre-) vocational (1) or general (0) type of education (ISCED classification).

Higher secondary. This dummy distinguishes the current track level within secondary education as higher secondary (1) or lower secondary (0).

Ethnic and sociocultural diversity of schools

Using the numbers of students from all countries of origin in the school involved, we calculated one minus the Herfindahl index as a measure of ethnic diversity (varying between 0 and 1).[5] Every country of origin here represented a separate ethnic group, including the native students. The index should be interpreted as follows: the value 0 means that there was no ethnic diversity at all in the school, because all students came from the same country of origin. Values that approach 1 represent a very high degree of diversity: all students at that school come from different countries of origin. The Herfindahl index has been criticized for being "color-blind" (Stolle et al., 2008; Voas, Crockett, & Olson, 2002), which means, for example, that a school with 20% Turkish students and 80% native students obtains the same diversity score as a school with 20% native students and 80% Turkish students. The specific ethnic share of the school is therefore also important, and hence we used appropriate indicators (see below).

In a similar way, we calculated the sociocultural diversity of the schools. Using the social class index (ESCS scores) of the parents we divided these parental scores into five categories: the group with the lowest 10% scores, the 10–30% group, the 30–70% group, the 70–90% group, and the group with the highest 10% scores.[6] Based on these five categories, we calculated the Herfindahl index of sociocultural diversity (varying between 0 and 1).[7] The index should be interpreted as follows: a value of 0 means that there is no diversity, because all parents of all students at that particular school are in the same ESCS category. A value approaching 1 indicates a very high level of diversity, indicating that the students are equally recruited from the five ESCS categories. As this Herfindahl index of sociocultural diversity is "level-blind" and therefore insensitive to the average parental educational level, we have also added the average ESCS of a school to the analysis (see below).

Ethnic and sociocultural average/share of schools

Percentage students with migrant background. For each school, we calculated the percentage of pupils with a migrant background. This index is the necessary counterpart of the Herfindahl index of ethnic diversity, which after all is "color-blind." Together, these indexes measure the combined effect of ethnic diversity and ethnic share.[8]

Average sociocultural status of the parents. We also calculated the average parental ESCS per school. This index is the necessary counterpart of the Herfindahl index of sociocultural diversity, which is "level-blind." Together, these indexes measure the combined effect of sociocultural diversity and sociocultural average.

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[5] The Herfindahl index of ethnic diversity was calculated as follows: 1–((percentage of ethnic group 1) ^{2} + (percentage of ethnic group 2) ^{2} + … + (percentage of ethnic group n) ^{2}).

[6] The groups are defined as follows: 1) Less than 10%: ESCS <=–1.1; 2) 10–30%: –1.0 < ESCS <=–0.4; 3) 30–70%: –0.3 < ESCS < =0.6; 4) 70–90%: 0.7 < ESCS <=1.2; 5) more than 90%: ESCS >=1.3.

[7] The Herfindahl index of sociocultural diversity was calculated as follows: 1–((percentage of parents from ESCS group 1) ^{2} + (percentage of parents from ESCS group 2) ^{2} + … + (percentage of parents from ESCS group 5) ^{2}).

[8] We could have used also the percentages of pupils with the five regions of origin. However, that would not change substantially our results. For simplicity reasons we use here the % pupils with a migration background.

Other characteristics of schools

The degree to which schools suffer a *shortage of teachers* is an index, which indicates to what extent education is hampered by a lack of the following factors: qualified physics teachers, qualified mathematics teachers, qualified language teachers, and qualified teachers for the other subjects. This index is based on answers given by school principals. The average of this index for teacher shortage was set to zero for all destination countries and all students to ensure that the comparisons for this item show the result for the student in a school exhibiting an average shortage of teachers.

Proportion qualified teacher in school. The index is the Proportion of teachers with at least ISCED 5A level (tertiary education).

Student-staff ratio: the number of students per staff member per school. This index is based on the answers given by the school principals. The average for this ratio was set to zero for all destination countries and all students to ensure that the comparisons for this item show the result for the students in schools with an average student-staff ratio.

Urbanization context: schools are located in different categories: rural area, town, city, or large city (including capital).

Regional Ethnic Diversity

In order to control for the level of ethnic diversity of the broader region we estimated regional ethnic diversity. Due to privacy, we do not now the region where schools are situated within their country. By we estimated that region by combining the four urbanization categories and country of test (total 60 (=15*4) combinations). Using the numbers of students from all countries of origin in the combination, we calculated one minus the Herfindahl index as a measure of regional ethnic diversity (varying between 0 and 1).[9] Every country of origin here represented a separate ethnic group, including the native students. The index should be interpreted as follows: the value 0 means that there was no ethnic diversity at all in that combination, because all students came from the same country of origin.

Analysis

Native students and students with an immigrant background have been analyzed separately, using multilevel analysis with four levels: students, schools, regions and countries. The countries of origin of the students with an immigrant background are treated as individual characteristics at the student level to keep the analysis as comparable as possible.

We include the *measurement error* of the five plausible values on science test as one of the error terms of the regression. The results of multilevel analyses with this measurement model are comparable to results using all the plausible values and averaging the coefficients.

[about here table 3]

Table 3 shows the results for students with an immigrant background and native students, respectively. The structure of the analysis is identical for both populations. Model 1 shows the effect of both ethnic and sociocultural diversity, and average/share on the students' science literacy, together with the individual characteristics of students (including their immigration characteristics), the other school characteristics and the urbanization context dummies. In model 2 we add the regional ethnic diversity to model 1. In model 3 we add two interaction terms (school ethnic diversity*city; school ethnic diversity*large city), which according to our

[9] The Herfindahl index of ethnic diversity was calculated as follows: 1–((percentage of ethnic group 1) ^{2} + (percentage of ethnic group 2) ^{2} + … + (percentage of ethnic group n) ^{2}).

hypothesis should have a positive effect on science literacy and that positive effect should neutralize eventual negative effects of schools in a (large) city or/and school ethnic diversity on science literacy.

Results

Model 1 reflects the earlier results of Dronkers & van der Velden (2013): school ethnic diversity has a negative effect on science literacy both for native pupils (-29.71) and for pupils with a migrant background (-27.18) but only the former is significant. The percentage migrant pupils per school has no significant effect; the same holds for school ESCS diversity although it has a nearly significant effect on science literacy for migrant pupils. The average parental ESCS per school has a strong positive effect, which cannot be explained by individual parental ECSC, the curriculum orientation of the school (vocational; higher secondary) or the resources of the school (teachers quality; teacher shortage; material resources). The importance of this latter, well-known effect of average parental ESCS per school is that the negative effect of school ethnic diversity cannot be easily explained by the socio-economic composition of schools. The positive and negative effect of the origin countries has been found regularly in cross-national analyses of educational performance of migrant (Dronkers & Fleischmann, 2010; Dronkers & Velden, 2013). The urbanization context has no significant effect in model 1 for pupils with a migrant background, but has a negative significant effect for native pupils.

We add in model 2 the variable regional ethnic diversity. This variable is only positive significant for native pupils. The addition hardly affects the parameter of school ethnic diversity. The negative effect of the urbanization context becomes stronger for native pupils by this addition of regional ethnic diversity.

Model 3 is the test of our hypothesis and research question. The interaction term 'Large city * school ethnic diversity' is positive and significant for both pupils with a migrant background (+71.96) and native pupils (+65.67), and the same holds for the interaction term 'City * school ethnic diversity' but only for native pupils (+20.39). The interaction term 'town * school ethnic diversity' is for neither populations not significant, although positive (not shown here). The addition of these interaction-terms makes the negative main effect of school ethnic diversity much stronger and makes the significant effect of regional ethnic diversity for native pupils insignificant. But this addition of these interaction-terms does not change the strength of the other school- and individual characteristics.

If we combine the main and interaction effects of school ethnic diversity the effect of school ethnic diversity outside cities is -43.05 (migrant pupils) or -41.65 (native pupils). In cities the effect of school ethnic diversity is smaller but still negative: -28.10 (migrant pupils; -43.05 + 14.95) or -21.23 (native pupils; -41.62 + 20.39). But in large cities the effect of school ethnic diversity has become positive: +28.91 (migrant pupils: -43.05 + 71.96) or +24.02 (native pupils: -41.62 + 65.67). This result fits with our hypothesis is that ethnic diversity in schools can have a positive effect on the educational performance of migrant students, but only in the context of a multi-ethnic metropolis.

Conclusion

We address in this paper the question whether ethnic diversity in school classes in the context of major cities and metropolises, where children from an early age grew up with the phenomenon of ethnic diversity, has a positive effect on the educational performance of migrant pupils, taking the ethnic composition of those classes into account? We use cross-national PISA 2006 data with 8,521 immigrant students from 35 different countries of origin, living in 15 Western destination countries, in 60 regions, attending 1,960 schools, and all 72,329 native students in these 15 Western countries, in 60 regions, attending 3,311 schools.

We test the hypothesis is that ethnic diversity in secondary schools can have a positive effect on the educational performance of migrant and/or native students, but only in the context of a multi-ethnic metropolis.

We find that the effect of school ethnic diversity outside cities is quite negative on the educational performance of 15-year-old migrant and native pupils. In cities the effect of school ethnic diversity is smaller but still negative for both migrant and native pupils. But in large cities the effect of school ethnic diversity on educational performance is positive for both migrant and native pupils. This result fits with our hypothesis is that ethnic diversity in schools can have a positive effect on the educational performance of migrant students, but only in the context of a multi-ethnic metropolis.

This means that we can answer our research question affirmatively: ethnic diversity in school classes in the context of major cities and metropolises, where children from an early age grew up with the phenomenon of ethnic diversity, has a positive effect on the educational performance of migrant pupils, taking the ethnic composition of those classes into account.

This result also supports the optimistic tone of the last section final section of Putnam's article. His expectation of a positive correlation between diversity and social capital contradicts his earlier drawn conclusions on the present. Within a context in which ethnic diversity has become a "normal" phenomenon from birth on, this optimistic expectation for the future of Putnam could indeed become true. Why did Putnam find a comparable result in his study about the relationship between ethnic diversity in cities and neighborhoods and trust and social capital of both in-group and out-groups in these cities and neighborhoods? Our preliminary answer would be that Putnam' study relates to adults in multi-ethnic metropolis, which in majority have not yet experienced ethnic diversity as a "normal" phenomenon from birth on, while our study relates to young 15-year-old pupils in multi-ethnic metropolis, which in majority have experienced ethnic diversity as a "normal" phenomenon from their birth on. Another explanation might be that the race relations within the USA are deviating from those elsewhere.

These outcomes support the studies of and Stolle and Harell (2012) and Sturgis et al. (2013) that age can be an important moderator of the relation between ethnic diversity of contexts and the functioning of these contexts. Ethnic diversity might only appear to be problematic for ethnic majority pupils and teachers who grew up with less direct and indirect contact with ethnic minority groups.

We wish to reiterate that with cross-sectional data, we can only establish associations or relationships between variables, but cannot rule out whether this association is not caused by another unmeasured variable. Here we are at the limits of cross-sectional international data.

To measure school ethnic diversity in different countries, information from a greater number of destination countries is necessary. Given the importance of migrant children's success in education, it is unfortunate that destination countries, such as Canada, France, England, the United States, and Sweden do not collect and make available the information needed for such an analysis, which limits our sample's comparability strength to some extent. However, our results for a restricted number of OECD countries can be considered representative of all OECD countries. In a yet unpublished analysis (Dronkers and Korthals, 2014), we compared migrant pupils' educational performance in OECD countries with and without detailed information about their parents' and their own birth countries. We found the strength of relevant variables, such as parental background, migrant generation, and home language was the same in both groups of OECD countries, suggesting the forced selection of OECD countries in our analysis does not bias our results when compared with all OECD countries.

References

Agirdag, O., Van Houtte, M., and Van Avermaet, P. (2012) Why Does the Ethnic and Socio-economic Composition of Schools Influence Math Achievement? The Role of Sense of Futility and Futility Culture. *European Sociological Review*, 28(3):366-378.

Braster, S. & Dronkers, J. (2013). *The positive effects of ethnic diversity in class on the educational performance of pupils in a multi-ethnic European metropole*. CReAM Discussion Paper Series 18/13. (http://www.cream-migration.org/publ_uploads/CDP_18_13.pdf).

Cheng, S., Martin, L. & Werum, R.E. (2007) Adult Social Capital and Track Placement of Ethnic Groups in Germany. *American Journal of Education*, 114(1):41-74.

Crosnoe, R., Cavanagh, S., and Elder Jr., G.H. (2003) Adolescent friendships as academic resources: the intersection of friendship, race, and school disadvantage. *Sociological Perspectives*, 46(3): 331-352.

Dronkers, J. & Fleischmann, F. (2010). The Educational Attainment of Second Generation Immigrants from Different Countries of Origin in the EU-Member-States. pp. 163-204 in *Quality and Inequality of Education. Cross-national Perspectives*, edited by J. Dronkers. Dordrecht/ Heidelberg/ London/ New York: Springer

Dronkers, J. and Korthals, R. (2014). *Tracking and Placement on Performance in Secondary Education. A cross-OECD analysis of migrants' student performance with and without origin country.* Keynote at the conference "How do educational systems shape educational inequalities?" Luxembourg University, 2–4 July 2014

Dronkers, J. & Velden, R. van der. (2013). Positive but also negative effects of ethnic diversity in schools on educational achievement? An empirical test with cross-national PISA-data. Pp. 71-98 in: *Integration and Inequality in Educational Institutions*, edited by M. Windzio, Dordrecht, Heidelberg, London, New York: Springer.

Dronkers, J., Velden, R. van der & Dunne, A. (2011). *The effects of educational systems, school-composition, track-level, parental background and immigrants' origins on the achievement of 15-years-old native and immigrant students. A reanalysis of PISA 2006.* ROA Research Memorandum 2011/6. (http://www.roa.unimaas.nl/pdf_publications/2011/ROA_RM_2011_6.pdf).

Ganzeboom, H. B. G., Graaf, P. de, Treiman, D. J., & De Leeuw, J. (1992). A standard international socioeconomic index of occupational status. *Social Science Research*, 21, 1–56.

Gorny, A. & S. Torunczyk-Ruiz (2014). Neighbourhood Attachment in Ethnically Diverse Areas: the Role of Interethnic Ties. *Urban Studies* 51: 1000-1018.

Hox, J. (2002). *Multilevel Analysis. Techniques and Applications.* Mahwah (NJ)/ London: Lawrence Erlbaum.

Lancee, B. & Dronkers, J. (2011). Ethnic, Religious and Economic Diversity in the Neighbourhood: Explaining Quality of Contact with Neighbours, Trust in the Neighbourhood and Inter-ethnic Trust for Immigrant and Native Residents. *Journal of Ethnic and Migration Studies* 37: 597-618

Laurence, J. (2011). The effect of ethnic diversity and community disadvantage on social cohesion: a multi-level analysis of social capital and interethnic relations in UK communities. *European Sociological Review* 27, 70-89.

Levels, M. & Dronkers, J. (2008). Educational performance of native and immigrant children from various countries of origin. *Ethnic and Racial Studies* 31, 1404–1425.

Levels, M., Dronkers, J., & Kraaykamp, G. (2008). Immigrant children's educational achievement in Western countries: Origin, destination, and community effects on mathematical performance. *American Sociological Review*, 73, 835–853.

Maestri, V. (2011). *A deeper insight into the ethnic make-up of school cohorts: Diversity and school achievement*. AIAS Working Paper 11–108. Amsterdam, The Netherlands: University of Amsterdam. (http://www.uva aias.net/uploaded_files/publications/WP108-Maestri.pdf)

Organization for Economic Cooperation and Development (2007). *PISA 2006. Science competencies for tomorrow's world*. Paris: OECD.

Peetsma, T., Van der Veen, I., Koopman, P., and Van Schooten, E. (2006). Class composition influences on pupils' cognitive development. *School Effectiveness and School Improvement*, 17(3)275-302.

Putnam, R. D. (2007). E pluribus unum: Diversity and community in the twenty-first century. The 2006 Johan Skytte prize lecture. *Scandinavian Political Studies*, 30, 137–174.

Raudenbush, S. W. & Bryk, A. S. (2002). Hierarchical Linear Models: Applications and Data Analysis Methods. London: Sage

Rosenthal, R., and Jacobson, L. (1968) *Pygmalion in the classroom: Teacher expectations and student intellectual development*. New York, NY: Holt, Rinehart, and Winston.

Rumbaut, R. (2004). Ages, life stages, and generational cohorts: Decomposing the immigrant first and second generations in the United States. *International Immigration Review*, 38, 1160–1205.

Stolle, D., & Harell, A. (2012). Social Capital and Ethno-Racial Diversity: Learning to Trust in an Immigrant Society. *Political Studies*, 61: 42-66.

Stolle, D., Soraka, S., & Johnston, R. (2008). When does diversity erode trust? Neighbourhood diversity, interpersonal trust, and the mediating effect of social interactions. *Political Studies*, 56, 57–75.

Sturgis, P., Brunton-Smith, I., Kuha, J. & Jackson, J. (2013). Ethnic diversity, segregation and the social cohesion of neighbourhoods in London. *Ethnic & Racial Studies*. (in print).

United Nations Educational, S. and C. O. (2006). *International Standard Classification of Education 1997*. Paris: UNESCO.

Veerman, G.-J.M., Van de Werfhorst, H.G., and Dronkers, J. (2013). Ethnic composition of the class and educational performance in primary education in The Netherlands. *Educational Research and Evaluation*, 19(5)370-401.

Voas, D., Crockett, A., & Olson, D. V. A. (2002). Religious pluralism and participation: Why previous research is wrong. *American Sociological Review*, 67, 212–230.

Table 1: Descriptive statistics migrants (N=8264)

	Minimum	Maximum	Mean	Std. Deviation
School Diversity ESCS	,00	,79	,6635	,07136
School Diversity Ethnic	,03	,84	,4156	,19445
Vocational orientation of school	,00	1,00	,0783	,26865
Higher secondary level	,00	1,00	,3412	,47407
Proportion of teachers with ISCED 5A	,000	1,000	,62215	,360779
School size	23	4468	852,23	635,797
Teacher-student ratio	,889	36,588	11,70453	3,970549
Quality of educational resources	-3,4335	2,1351	,320226	1,0109812
Teacher shortage (negative scale)	-1,0568	3,6194	,300517	,9833698
ESCS Index of economic, social and cultural status	-4,4421	2,9709	-,233492	1,0170740
Second generation migrant	1,00	12,00	1,9157	2,05363
Science literary	130,30	841,04	469,7285	103,35772
Measurement error Science literacy	,00	4005,65	585,9680	458,06741
One parent migrant, other parent native	,00	1,00	,0571	,23208
Country of birth one parent unknown	,00	1,00	,1370	,34385
Home language as in country of destination	,00	1,00	,5027	,50002
Home language unknown	,00	1,00	,1088	,31139
Female	,00	1,00	,5017	,50003
school located in rural area	,00	1,00	,2988	,45774
school located in town	,00	1,00	,3238	,46796
school located in city	,00	1,00	,2058	,40433
school located in large city	,00	1,00	,1716	,37704
Average parental ESCS per school	-2,07	1,64	,0322	,50257
% pupils with migrant background per school	,00	100,00	31,4801	22,68874
Western-OECD origin	,00	1,00	,4607	,49848
Islam countries origin	,00	1,00	,1579	,36468
non-Islam Asian countries origin	,00	1,00	,0934	,29103
Eastern Europe origin	,00	1,00	,2686	,44328
sub-Saharan Africa origin	,00	1,00	,0357	,18554
Grade	-2,00	3,00	,4895	,74385
Regional Ethnic Diversity	,06	,64	,4156	,10803

Table 2: Descriptive statistics Natives (n=70881)

	Minimum	Maximum	Mean	Std. Deviation
Regional Diversity Ethnic	,00	,64	,1705	,14293
School Diversity ESCS	,00	,80	,6509	,08462
School Diversity Ethnic	,00	,84	,1325	,16470
Vocational orientation of school	,00	1,00	,0682	,25204
Higher secondary level	,00	1,00	,3908	,48775
Proportion of teachers with ISCED 5A	,000	1,000	,71849	,338762
School size	9	4468	680,33	451,817
Teacher-student ratio	,889	36,588	11,79753	3,796333
Quality of educational resources	-3,4335	2,1351	,108637	,9870314
Teacher shortage (negative scale)	-1,0568	3,6194	,089354	,9625641
ESCS Index of economic, social and cultural status	-4,3905	3,3487	,171860	,8912866
Science literacy	107,74	825,65	517,7170	91,43548
Error Science literacy	,00	5087,80	565,6377	442,84378
Female	,00	1,00	,4984	,50000
school located in rural area	,00	1,00	,4024	,49039
school located in town	,00	1,00	,3329	,47124
school located in city	,00	1,00	,1795	,38380
school located in large city	,00	1,00	,0852	,27918
Average parental ESCS per school	-2,19	1,69	,1405	,50289
% pupils with migrant background per school	,00	100,00	7,3004	11,88545
grade	-2,00	3,00	,6524	,71436

Table 3: Science literary of native pupils and pupils with migrant background: four level regression analysis

	migrants			natives		
Constant	443.35** (15.35)	443.60** (15.41)	445.80** (15.54)	482.50** (8.77)	482.52** (8.34)	485.16** (8.24)
Individual characteristics						
Parental ESCS	19.43** (1.61)	19.52** (1.61)	19.45** (1.61)	23.63** (0.47)	23.62** (0.46)	23.60** (0.46)
Eastern Europe origin (ref=W. OECD)	-10.02** (2.86)	-10.07** (2.87)	-10.20** (2.87)	-	-	-
Non-Islamic Asia origin (ref=W. OECD)	11.89** (3.89)	12.07** (3.89)	10.90** (3.90)	-	-	-
Islamic countries origin (ref=W. OECD)	-25.17** (3.15)	-25.26** (3.16)	-25.13** (3.16)	-	-	-
Sub-Saharan Africa origin (ref=W. OECD)	-18.69** (4.65)	-18.62** (4.65)	-18.82** (4.65)	-	-	-
Female	-8.54** (1.67)	-8.50** (1.67)	-8.55** (1.67)	-7.78** (0.57)	-7.70** (0.57)	-7.73** (0.57)
Home language same as in destination country	18.12 **(2.19)	17.93 **(2.19)	18.11 **(2.19)	-	-	-
Home language unknown	-17.43** (2.81)	-17.52** (2.81)	-17.42** (2.81)	-	-	-
One parent migrant, other parent native	12.32** (3.81)	12.51** (3.81)	12.10** (3.81)	-	-	-
Country of birth one parent unknown	-1.87 (2.50)	-1.92 (2.50)	-1.75 (2.50)	-	-	-
Second-generation migrant	6.51** (1.84)	6.69** (1.84)	6.54** (1.84)	-	-	-
Grade (test country centered)	34.24** (2.49)	34.43** (2.49)	34.43** (2.49)	34.26** (0.90)	34.25** (0.88)	34.22** (0.89)
School characteristics						
Vocational (ref=general)	-42.45** (5.26)	-42.43** (5.26)	-42.49** (5.25)	-48.58** (2.52)	-48.38** (2.51)	-48.41** (2.50)
Higher secondary (ref=lower)	10.64** (4.48)	10.25** (4.50)	9.47** (4.50)	16.65** (2.38)	16.49** (2.36)	16.17** (2.36)
Average parental ESCS per school	45.34** (4.51)	45.34** (4.51)	45.03** (4.50)	45.18** (2.08)	45.24** (2.08)	45.17** (2.07)
% pupils with migrant background	0.11 (0.13)	0.10 (0.13)	0.13 (0.13)	-0.09 (0.13)	-0.13 (0.13)	-0.13 (0.13)
School ESCS diversity	31.12 (16.40)	31.54 (16.41)	34.71** (16.27)	12.24 (7.00)	10.51 (7.01)	10.84 (6.87)
School Ethnic diversity	-27.18 (14.05)	-24.51 (14.12)	-43.05** (15.11)	-29.71** (10.78)	-28.43** (10.78)	-41.62** (10.97)
School material educational resources	3.87** (1.31)	3.89** (1.31)	3.99** (1.30)	0.46 (0.68)	0.46 (0.68)	0.46 (0.67)
% qualified teachers with ISCED 5a or more	16.43** (4.68)	16.58** (4.67)	16.50** (4.65)	10.70** (2.23)	10.75** (2.23)	10.23** (2.21)
Teacher shortage	-3.04** (1.43)	-2.99** (1.43)	-2.88** (1.43)	-4.87** (0.72)	-4.88** (0.72)	-4.87** (0.72)
Student/staff ratio	0.10 (0.38)	0.10 (0.38)	0.12 (0.38)	0.04 (0.20)	0.12 (0.20)	0.12 (0.20)
School size (10*)	0.07** (0.03)	0.07** (0.03)	0.07** (0.03)	0.13** (0.02)	0.09** (0.02)	0.11** (0.02)
Region						
Town (ref=rural)	-3.44 (4.66)	-1.30 (4.49)	-0.83 (4.76)	-8.18** (2.80)	-10.15** (2.77)	-8.50** (2.87)
City (ref=rural)	-3.29 (5.05)	-.87 (5.82)	-2.77 (7.67)	-10.14** (3.06)	-14.48** (3.38)	-14.19** (3.71)
Large city (ref=rural)	-9.12 (6.71)	-.99 (9.76)	-35.61** (9.99)	-10.70** (4.33)	-19.68** (5.48)	-28.16** (5.87)
City * School Ethnic diversity	-	-	14.95 (16.09)	-	-	20.39** (9.58)
Large city * School Ethnic diversity	-	-	71.96** (19.81)	-	-	65.67** (12.06)

Region Ethnic diversity	-	-32.07 (25.86)	-30.71 (26.94)	-	41.73** (16.45)	20.53 (17.21)
Educational system characteristics						
Strongly stratified (ref=Moderate & Comprehensive)	-3.52 (12.22)	3.89 (13.99)	4.80 (14.61)	18.89 (10.99)	10.35 (10.49)	14.99 (10.90)
Parental ESCS* strongly stratified	-6.01** (2.00)	-6.10** (2.00)	-6.06** (2.00)	-11.54** (0.74)	-11.52** (0.74)	-11.51** (0.74)
Average ESCS* strongly stratified	20.70** (5.77)	20.79** (5.78)	20.49** (5.77)	-2.97 (2.81)	-3.11 (2.79)	-2.61 (2.78)
Variation						
Test-country level	445.92 (158.16)	507.53 (212.05)	557.99 (239.99)	402.43 (130.40)	329.05 (128.73)	351.52 (140.13)
Region level	47.75 (31.80)	28.31 (24.45)	39.57 (28.30)	45.86 (15.38)	39.35 (11.51)	43.30 (14.90)
School level	1015.75 (80.24)	1016.62 (80.21)	992.00 (79.24)	793.62 (26.85)	796.42 (26.84)	783.59 (26.54)
Individual level	4358.42 (95.42)	4351.90 (95.43)	4359.98 (95.42)	4685.01 (31.66)	4514.55 (31.80)	4546.55 (31.86)
Test-level	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)	0.001 (0.000)
Log likelihood	94568	94558	94553	810110	810109	810111