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Policy Brief

Are school characteristics related to equity? The answer may depend on a country's developmental level

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SUMMARY

In most countries, students' socioeconomic status (SES) is strongly related to their educational achievement: the higher a student's SES, the higher his or her achievement scores, and vice versa. This lack of equity in student outcomes is of great concern to policy makers because educational achievement should not depend on family background. This policy brief examines how school characteristics may be associated with educational equity in terms of the relationship between students' SES and achievement. There was a clear distinction between highly-developed and developing countries; school characteristics differed in their relationship to educational equity in these two groups. Instructional quality, school emphasis on academic success, and a safe and orderly school climate were associated with a looser relationship between SES and achievement; family background was thus less important in many highly-developed countries, and school characteristics were consequently related to greater equity. In contrast, the same school characteristics exhibit no such association in developing countries; in some cases, instructional quality, school emphasis on academic success, or a safe and orderly school climate were related to exacerbated inequality.

POLICY IMPLICATIONS

Highly-developed countries are well-advised to pay attention to school characteristics if they are interested in supporting educational equity. Our findings indicate that a number of school characteristics, such as instructional quality, a school's emphasis on academic success, and a safe and orderly school climate, may have a compensatory effect by weakening the relationship between students' SES and achievement. Such characteristics may lead to greater equity. Students coming from lower-SES families may profit particularly, which suggests:

(1) Highly-developed countries are advised to improve teachers' instructional quality.
(2) Highly-developed countries are advised to emphasize academic success in schools.
(3) Highly-developed countries are advised to care about a safe and orderly school climate.

In contrast, developing countries need to think about the conditions of their educational system. High-quality schools in these countries do not necessarily help diminish the achievement gap and may even be related to exacerbated inequality. While in many developing countries, students from higher SES families profit strongly from high instructional quality, a school's emphasis on academic success and an orderly climate, this could be a result of socially segregated school systems. This may indicate, for example, that there are generally better teachers and resources in schools with students from high-SES families. Developing countries are thus advised to review the learning conditions in schools where the majority of students come from low-SES families.

INTRODUCTION

In most countries, students' socioeconomic status (SES) is strongly related to educational achievement: the higher a student's SES, the higher his or her achievement scores tend to be, and vice versa. Hence, most models demonstrate achievement gaps between students from high-SES and low-SES homes, which can be argued as reflecting a lack of educational equity. Policymakers who aim to reduce this achievement gap should be aware of school characteristics that potentially weaken the relationship between SES and achievement and, thus, have a compensatory effect. Improving such characteristics has the potential to improve equity. Data from international large-scale assessments can enable the identification of such school characteristics across countries.

Previous research has reported that good instructional quality may be linked to better student achievement. This includes aspects such as clarity of instruction, cognitive activation, classroom management, and a supportive climate (Klieme, Pauli & Reusser, 2009). A safe and orderly school climate has also been found to be related to higher student achievement (Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013). An orderly school environment may not in and of itself guarantee high student achievement, however it may better facilitate student learning than situations where student discipline is a problem or where students experience an unsafe environment (Osher, Dwyer, & Jimerson, 2006). Finally, research reveals that a school climate that places high emphasis on academic success is positively associated with achievement (Wu, Hoy, & Tarter, 2013).

These results suggest that improving school climate and the quality of instruction may be beneficial for equity of educational outcomes because schools provide an appropriate environment for learning. However, most of the existing studies have used data from single countries, in particular from developed Western countries only. We investigate this question using data from 46 countries representing a broad range of developmental levels to get an idea how generalizable results are across countries and in particular beyond highly-developed Western countries. We do not assume that results gained in some parts of the world can easily be transferred to other parts. (For a definition of "developing" and "developed" countries, as well as the other terms used in this brief, see the box entitled Definitions.)

DATA

The data used in this study come from 46 of the 50 countries or educational systems (here also termed countries) participating in the 2011 Trends in International Mathematics and Science Study (TIMSS) for grade 8 (Mullis, Martin, Foy, & Arora, 2012). Mathematics achievement was used as the outcome. Students' family background was assessed by a variable derived from student ratings of the number of books at home, their parents' highest education, and home study supports, such as having their own room and internet connection.

Instructional quality was also measured by students' ratings, while a school's emphasis on academic success and a safe and orderly school climate were measured by principals' ratings. School principals reported on the seriousness of ten potential problems

DEFINITIONS

To distinguish between "highly-developed" and "developing" countries, we used the United Nations' (UN) Human Development Index (HDI), which is a composite measure of country-level human development (UNDP, 2014). The HDI incorporates information about life expectancy at birth, years of school education, and income per capita in an index score that ranges from 0 to 1. The higher the HDI index score, the higher the level of development in a country. Developed countries are categorized as those with an HDI of ≥ 0.800, whereas developing countries have an HDI < 0.800. A few countries, such as Taiwan, do not have official UN estimates. In these cases, estimates of HDI provided by the countries themselves were used, calculated using the same formula applied by the UN (see, for example, with respect to Taiwan: http://www.dgbas.gov.tw/public/Data/491716362790WG0X9I.pdf).

The terms "family background" and "socioeconomic status (SES)" are used interchangeably in this policy brief. A composite variable derived from the number of books at home, parents' highest education and home study support reported by students serves as an indicator.

An "achievement gap" exists if a difference in score points between students from low- and high-SES families exists in a country.

A country is regarded to have a "compensatory" educational system if school characteristics weaken the relationship between SES and achievement and, thus, more equality exists. A country is regarded as having an "anti-compensatory" educational system if school characteristics exacerbate this relationship so that inequality increases.

at their school, such as unjustified student absences, classroom disturbances, vandalism, theft, or fights among students. Furthermore, they reported on five characteristics related to an emphasis on academic success, for example teachers' expectations for student achievement, parents' support for student achievement, and students' desire to do well in school. Students were asked about three characteristics of instructional quality they experienced in class: whether the students know what teachers expect them to do, whether their teachers are easy to understand, and whether they are interested in what teachers say.

METHODS

The relationship of student's SES to achievement may be different between schools and/or countries. This relationship can be explored using regression analysis. One measure of the strength of the relationship between SES and achievement is the regression coefficient, which indicates how much achievement is expected to increase when SES increases within one category. When the regression coefficient is low or even zero, there is little evidence of a linear relationship between SES and achievement, suggesting that equity exists because achievement is not systematically related to students' family background. If a large number of schools is investigated, the within-school regression coefficients may vary across schools; school-level characteristics may explain this variation. For instance, instructional quality might be identified as being negatively related to the regression coefficients, which would imply that schools with high instructional quality have smaller achievement gaps due to SES and, thus, more equity, and that schools with lower instructional quality have larger achievement gaps. To examine this, two-level modelling with random slopes was applied using the software package Mplus (Muthén & Muthén, 1998–2015). For each country, we investigated whether instructional quality, a school's emphasis on academic success, and an orderly school climate explained the within-school regression coefficients for students' achievement on their SES (Figure 1).

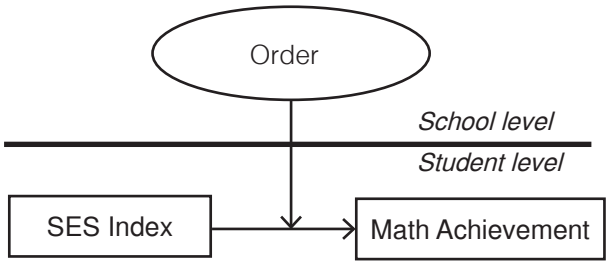

Figure 1: The influence of a safe and orderly school climate (Order) on the relation between student socioeconomic status (SES) and mathematics achievement.

RESULTS AND DISCUSSION

Do highly-developed and developing countries differ in relation to SES?

Our model shows that school characteristics perform differently depending on the developmental level of a country (Table 1). We used the United Nations' (UN) Human Development Index (HDI) to categorize nations (UNDP [United Nations Development Programme], 2014). We found that an HDI estimate of 0.800 splits the 46 TIMSS countries in two groups (23 highly-developed and 23 developing countries). In almost half of the highly-developed countries, at least one, and often two of the school characteristics examined in this policy brief, had compensatory predictive power. The relation between students' SES and their achievement was weaker if schools in these countries had higher instructional quality, put more emphasis on academic success, or had a safe and orderly school climate. The school characteristics thus predicted higher equity in these countries, because students from families with a lower SES profited more in terms of achievement than students from families with a higher SES. For this group of highly-developed countries, the achievement gap was typically diminished, and the school characteristics had compensatory predictive power promoting equity.

In contrast, instructional quality, school emphasis on academic success, and a safe and orderly school climate were not related to greater equity in developing countries. More worryingly, in those countries where a significant relationship was found these characteristics tended to exacerbate the achievement gap, rather than reducing it as was found in the higher-developed countries.

In developing countries, the achievement gap between students from low- and high-SES families was more pronounced in high quality schools than in other schools, indicating greater inequality.

In a few countries, the prevailing patterns for highly-developed and developing countries were reversed. For example, the school characteristics we investigated showed an "anti-compensatory" relationship in the United States, while in most highly developed countries such characteristics showed "compensatory" associations. Among developing countries, the Russian Federation was an exception where the school characteristics were related to greater equity. These results warn against quickly applying strategies successful in one country to another without full consideration of system characteristics.

Why do school effects differ among countries?

Here, the available data do not permit cause-effect conclusions. Based on previous research, we hypothesize that school systems in developing countries may be socially more segregated than those in highly-developed countries. Students with different family backgrounds typically live in different neighbourhoods, and are then sorted into different schools, thereby creating positive compositional effects and a better school climate for high-SES schools. The same anti-compensatory effect could be caused by organizational differentiation through tracking (Hanushek & Wößmann, 2006). The anti-compensatory effect of these school characteristics may thus be due to unequal access to good education for low- and high-SES students.

Which school characteristic was particularly predictive of greater equity?

School emphasis on academic success had the most significant influence on the relationship between SES and achievement (Table 1). In Australia, Canada (Quebec), Chinese Taipei, Finland, Lithuania, and Slovenia, more equity was observed in schools with greater emphasis on academic success. Thus, a school climate that prioritizes students' learning and success predicts a weaker association between home background and achievement in these countries. In contrast, in Israel and South Africa, a greater emphasis on academic success was significantly related to more inequality (Table 1). When teachers', parents' and students' achievement expectations were high, the relationship between student SES and achievement was stronger and the achievement gap larger.

An orderly school climate was statistically significant in Australia, Canada (Quebec), Norway, the Russian Federation, Singapore and Sweden. In these countries, the achievement gap between low-SES and high-SES students was smaller when a school had an orderly climate.

This means that findings for these schools showed compensatory predictive power in these countries. In contrast, an orderly climate was anti-compensatory in Turkey and the USA, which may be a result of socially segregated school systems. However, the data available from TIMSS does not allow for firm conclusions due to its cross-sectional nature.

In general, instructional quality appeared to be less relevant than the other two school characteristics that we examined, although Singapore, Hong Kong, Chinese Taipei and Thailand appeared to have compensatory educational systems. In these countries, in schools where teachers provided high quality of instruction, student family background had a lower predictive power. Moreover, the estimated achievement gap was smaller. In other words, low-SES students attending a school with higher instructional quality performed better than

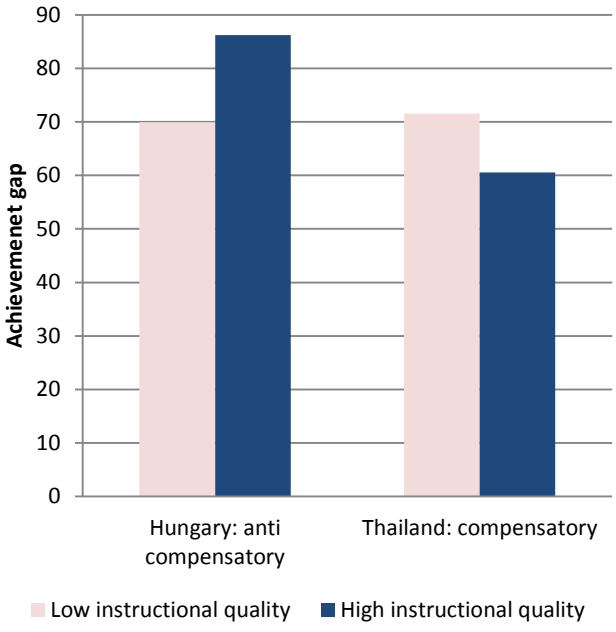

Figure 2: Example of two countries with compensatory or anti-compensatory educational systems
(Achievement gap = difference in score points between students from low- and high-SES families)
Results are based on grade 8 data from IEA's TIMSS 2011 (Mullis et al., 2012).

Table 1: Contribution of school characteristics to equity

Country	Instructional quality	School emphasis on academic success	Orderly school climate	Human development index (HDI)
Norway				0.943
Australia				0.931
United States				0.912
New Zealand				0.908
Canada (Quebec)				0.901
Singapore				0.899
Sweden				0.897
England				0.890
Hong Kong				0.889
Japan				0.888
Korea				0.888
Israel				0.886
Chinese Taipei				0.882
Finland				0.879
Slovenia				0.874
Italy				0.872
Qatar				0.850
Saudi Arabia				0.833
Lithuania				0.831
UAE				0.825
Chile				0.819
Hungary				0.817
Bahrain				0.813
Romania				0.782
Oman				0.781
Russian Fed				0.777
Malaysia				0.770
Lebanon				0.764
Turkey				0.756
Kazakhstan				0.755
Iran				0.749
Jordan				0.744
Georgia				0.741
Ukraine				0.733
Macedonia				0.730
Armenia				0.728
Thailand				0.720
Tunisia				0.719
Palestinia				0.683
Botswana				0.681
Indonesia				0.681
Syria				0.662
South Africa				0.654
Honduras				0,616
Morocco				0.614
Ghana				0.571

Note Results are based on grade 8 data from IEA's TIMSS 2011 (Mullis et al., 2012). Countries are ordered according to the 2014 Human Development Index measure (UNDP, 2014).

Key:

School characteristics have a compensatory effect, which means that they demonstrate a reduced relationship between student SES and achievement, so that it is weaker where high instructional quality exists. These school characteristics are associated with greater equity.

School characteristics have an anti-compensatory effect, which means that they demonstrate an exacerbated relationship between student SES and achievement. More positive school characteristics are here related to greater inequality; this may be caused, for example, by a socially segregated school system.

low-SES students in schools with lower instructional quality. For example, in Thailand the achievement gap was 72 score points in schools with low instructional quality but only 61 points in schools with high instructional quality (Figure 2). These four countries are hence compensatory systems that are predictive of more equity; as all were Asian countries the result may reflect a cultural effect.

In contrast, Hungary, Kazakhstan and Armenia were countries where a higher level of instructional quality was related to a lower degree of equity. For these countries, the estimated achievement gap between low and high SES students was larger for higher levels of instructional quality. For example, in Hungary the achievement gap between high SES and low SES students was 70 score points in schools with low instructional quality and 86 points in schools with high instructional quality (Figure 2). This could imply that Hungarian schools provide high quality teachers to high SES students. Hungary can thus be regarded as an anti-compensatory country when it comes to instructional quality.

Our findings, seen in light of previous research, suggest that many developing countries have segregated school systems and unequal access to resources. For instance, high SES students may have better access to higher instructional quality, and school climates that are safe and orderly and prioritize learning and success, than their low SES student counterparts. For some developing countries, this seems to result in an anti-compensatory association, where the achievement gap increases when the quality of the school increases. For highly developed countries, our model suggests that some manage to make use of their resources (like teachers with high instructional quality or good school climates) to promote equity and reduce the achievement gaps between high and low SES students.

CONCLUSIONS

Achievement gaps related to family background need to be addressed if countries are concerned with equity. School characteristics may have the potential to compensate for disadvantages created by socioeconomic background. Countries with compensatory school systems were almost exclusively highly-developed countries. Among these, some systems are compensatory with respect to more than one school characteristic; these school characteristics are correlated, but they also independently explain better equity. There are fewer anti-compensatory systems, and, for the most part, these occur in developing countries. This distinction indicates that the more highly developed countries have better capacity to ameliorate the effect of SES on student achievement. Our results caution against applying strategies successful in one country to another without full consideration of system characteristics.

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