Why are children from disadvantaged families left behind?

The impacts of families, schools, and education systems on students' achievement

Anne Christine Holtmann

Thesis submitted for assessment with a view to
obtaining the degree of Doctor of Political and Social Sciences
of the European University Institute

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Examining Board

Prof. Fabrizio Bernardi, European University Institute (Supervisor)
Prof. Hans-Peter Blossfeld, European University Institute
Prof. Heike Solga, Berlin Social Science Centre (WZB)
Prof. Herman van de Werfhorst, University of Amsterdam and Amsterdam Centre for Inequality Studies (AMCIS)

Abstract

In this thesis, I examine how families, schools, and education systems shape inequalities in children's school achievements. I show that in the United States, low-SES children fall behind their peers from better-off families over the course of primary and middle school. This is true even for those low-SES students who perform at similar levels than their peers from better-off families at the time of school entry. Why are these children left behind? Does this happen because they are raised in families that are more disadvantaged than those of their peers from better-off families, or because they attend schools of lower quality than those of their higher-SES peers? To separate the effects of families and schools, I compare learning that takes place during the summer holidays to learning that takes place during the school year. During the summer holidays, schools are closed and learning mainly reflects family influences. During the school year, both schools and families influence learning. Thus, the influences of these two institutions on learning can be disentangled by comparing summer learning and school-year learning. In addition, I examine parents' educational behavior, finding evidence of their compensatory behavior when their children perform poorly.

To determine whether the effects of schooling vary among countries, I compare these effects in the United States and Finland. In the United States, schools are segregated and of varying quality, whereas in Finland, there are relatively small differences between schools in terms of their student intakes and quality. To avoid overstating the effects of schools, I compare summer learning and school-year learning in both countries. I find that in Finland, the lower level of socioeconomic inequality between families helps to explain the higher level of education opportunity. Moreover, Finnish schools are better able to compensate for a disadvantageous family environment than are schools in the United States.

To determine whether the socioeconomic inclusiveness of an education system benefits disadvantaged students but harms high-performing students or those from better-off families, I analyze how changes in the level of socioeconomic inclusiveness of the education system affects high- and low-SES students. Based on my findings, I conclude that whereas socioeconomically inclusive education systems benefit disadvantaged students, high-SES students perform well everywhere.

Keywords: Competence development, families and schools, cumulative disadvantage, compensatory advantage, school differentiation and segregation, equality of opportunity, excellence

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I would like to dedicate this thesis to my mother, Elisabeth Holtmann.

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1. Introduction: The impacts of families, schools, and education systems on students' achievement

1.1 Introduction and research questions

1.1.1 Equality of opportunity and the role of schools and education systems

Giving children the opportunity to succeed in education, regardless of their family background, is part of the dream of equality of opportunity. However, in reality socioeconomically disadvantaged children are less likely to succeed in school. Whereas this is an established finding within the educational research literature, it is less clear *why* this is so. What is the role of families and schools in the creation of educational inequalities? Are schools a "great equalizer" (Mann, 1848), providing opportunities for children from socioeconomically disadvantaged families? Or, conversely, do schools amplify not opportunity but inequality, because children from socioeconomically disadvantaged families attend disadvantaged schools in terms of facilities, teachers, and peers, while children from better-off families attend high-quality schools? Moreover, are there variations between education systems? Or is socioeconomic inequality between families and not education policy and schools at the root of the problem? These are the main questions that this thesis addresses.

International student assessments such as the PISA, TIMSS, or PIRLS study have given new impetus to comparative studies of different education systems (Horn, 2009; Le Donné, 2014; OECD, 2011; Van de Werfhorst & Mijs, 2010); (for an early comparative study, see Shavit & Blossfeld, 1993). Policymakers and the public in several countries were shocked by the results of the first PISA study conducted in 2000. This was especially apparent in the United States and Germany, both of which demonstrated below average scores in the PISA assessments and high levels of inequality of educational opportunity, with student achievement being more strongly related to family background in these countries compared with most other countries. "The American dream is leaving America" wrote Kristof (2014) in the *New York Times*. By contrast, in Finland, Canada, South Korea, and Singapore, students perform well, and educational opportunities are comparatively more equal in these countries. Therefore, the results from these countries demonstrate that there is no trade-off between equality of opportunity and excellence in education. Consequently, Fleetwood (2013) suggests: "If you want the American Dream, go to Finland."

The high performance of students in Finland, Canada, South Korea, and Singapore in PISA assessments has prompted the emergence of a growing literature on their education systems (Darling-Hammond, 2010; OECD, 2011). The title "Finnish lessons: What the world can learn from educational change in Finland" (Sahlberg, 2015) suggests that these countries' education systems offer wider lessons. For example, Finland stands out as having a highly

egalitarian education system with very low levels of inequality between schools (OECD, 2011; Sahlberg, 2015). Conversely, the United States notably has one of the most socioeconomically segregated education systems among the assessed OECD countries. Moreover, in Germany, students are tracked at an early stage into different types of schools. Sahlberg (2015) argues that Finland's education reforms have been aimed at achieving equality of opportunity, thereby also providing abundant educational opportunities for socioeconomically disadvantaged students, whereas such students generally attend socioeconomically disadvantaged schools in the United States and lower track schools in Germany.

The notion that the features of particular education systems influence students' performance and equality of opportunity is supported by comparative research. Specifically, studies have found that institutional structures that foster socioeconomic segregation of schools—such as early differentiation into different tracks, selective schools, and private schools with fees—amplify inequality of opportunity (Hanushek & Woessmann, 2006; Horn, 2009; Le Donné, 2014; Van de Werfhorst, 2013, 2015; Woessmann, 2009). In their review of these studies, Van de Werfhorst and Mijs (2010) conclude that differentiating students into different school types magnifies inequality of educational opportunity. Standardization, by contrast, reduces inequality of education opportunity. The finding that differentiation and socioeconomic segregation magnify educational inequality is supported by studies focusing on single countries (Coleman et al., 1966; Kerr, Pekkarinen, & Uusitalo, 2013; Rumberger & Palardy, 2005; Schwartz, 2010).

However, the view that differentiation and socioeconomic segregation of schools magnify socioeconomic achievement gaps, and that inequality of educational opportunities can therefore be primarily addressed through the formulation of appropriate education policies has been challenged on two accounts. First, it has been argued that inequality of educational opportunities stems from inequalities between families (Alexander, Entwisle, & Olson, 2001; Berliner, 2013; Condron, 2013; Downey, von Hippel, & Broh, 2004; Merry, 2013; Solga, 2014). A second argument is that SES achievement gaps are already present when children enter school and remain largely unchanged throughout their school careers (Cunha & Heckman, 2010; Heckman, 2006; Merry, 2013). I address these two arguments in this thesis.

1.1.2 Inequality between families not between schools

Based on their comparisons of gains in summer learning and school-year learning, researchers who hold with the first view, namely that inequality between families is at the root of the problem, argue that achievement gaps are mainly the outcome of what happens outside schools. They contend that achievement gaps would be even more pronounced if children did not attend school (Alexander et al., 2001; Downey et al., 2004; Heyns, 1978). Thus, they argue that the research focus on schools and education policy could detract attention from the real obstacle to achieving equality of educational opportunity, namely socioeconomic inequalities between families (Alexander et al., 2001; Berliner, 2013; Downey et al., 2004; Solga, 2012). Consequently, Berliner argues that "[t]he design of better economic and social policies can do more to improve our schools than continued work on educational policy

independent of such concern" (Berliner, 2013, p. 2). Accordingly, tackling rising income inequality would constitute a major step toward reducing educational inequality.

1.1.3 The role of children's competencies prior to school entry

The second position that questions the importance of schools holds that SES achievement gaps are for the most part present when children enter school. Therefore, the role of schools in generating SES achievement gaps is limited. These arguments originate from two contrasting directions, depending on which source is considered responsible for early achievement gaps. On the one hand, Herrnstein and Murray (1994), and more recently Marks (2014), claim that achievement gaps are largely the product of inherited IQ differences rather than stemming from family or school conditions. A "new class structure emerged, in which it became more consistently and universally advantageous to be smart" (Herrnstein & Murray, 1994, p. 27). Therefore, they are convinced that bright children will make it to the ranks of the "cognitive elite," even if their families' socioeconomic status is low. To sum up, the authors claim that children's abilities, and not their families or school environments, are the determinants of achievement gaps.

Within the second strand of literature proponents of the argument that SES achievement gaps are largely already present at the time of school entry claim that preschool education is the key to opening up educational opportunities for children from disadvantaged homes (Heckman, 2006; Waldfogel, 2004). Heckman suggests that the early years prior to school entry are a "sensitive period" during which children's brains are the most plastic. In addition, he argues that skills beget skills. Children who enter school well prepared will be better able to avail of the learning opportunities that they encounter at school (Raudenbush & Eschmann, 2015; Sørensen & Morgan, 2000). Consequently, the most efficient way of improving student performance is to invest in their early development (Heckman, 2006). This does not mean that schools have no impact on educational inequality but that their effects are limited, because they build on children's experiences prior to school entry.

In the remainder of the introduction, I, first, elucidate why schools could be equalizers or stratifiers. Second, I discuss the methodological challenges one is faced with when investigating the role of families and schools. Third, I briefly introduce my methodological approach and contribution to the literature. Fourth, I present my arguments and finish the introduction with an outline of my chapters.

1.2 Why schools could be equalizers or stratifiers

1.2.1 Are schools the great equalizer?

Horace Mann, the "father" of American public education, held that schools were the foundation of the American dream. He envisaged universal public education that provides a common learning experience for all children. He contrasted this vision with European education during this period. He explained:

> According to the European theory, men are divided into classes,--some to toil and earn, others to seize and enjoy. According to the Massachusetts theory, all are to have an equal chance for earning, and equal security in the enjoyment of what they earn. […] Education, then, beyond all other devices of human origin, is the great equalizer of the conditions of men (Mann, 1848).

School attendance is now compulsory for a stipulated number of years. Therefore, Ansell (2010, p. 2) argues that compulsory education is the most universal welfare state institution and the "sharpest edge of progressive redistribution. Not only does it transfer resources from the rich to pay for the education of the poor, but it also potentially undermines the position of the rich—and their children—in the distribution of income." Thus, Ansell argues that compulsory education offers an avenue for social mobility.

This idea also underlies a social investment strategy in which the utilization of education as a social policy prevents people from falling into poverty and unemployment (Allmendinger & Leibfried, 2003; Esping-Andersen, 2002; Giddens, 1998; Morel, Palier, & Palme, 2012). Hacker (2015) expresses this idea, referring to education as a "pre-distribution" policy, because it affects market incomes and prevents poverty, whereas classical social policies redistribute resources to those who need them as a result of being unemployed or retired.

The notion of schools as equalizers hinges on the idea that compulsory education provides a common learning experience for all children. The argument is that schools partly compensate for the lack of cognitive stimulation at home. Children could blossom as a result of listening to stories, reading books, playing an instrument, or discovering science experiments when they experience these activities and their content as new and exciting (Cebolla-Boado, Radl, & Salazar, 2017). Therefore, such activities could open up new horizons (Figure 1.1). For children who are surrounded by books, musical instruments, science kits, and parents who discuss the news with them, schools could be less crucial in this regard.

Figure 1.1: A portrayal of schools opening up the worlds of literature, music, and science[1]

A similar argument uses the learning curve to explain why students who were initially behind their peers at school entry are able to catch up. Progress at the bottom of the learning curve is faster/easier and levels out with increased experience (Ebbinghaus, 1885). Therefore, when students from disadvantaged families enter school, they learn faster than their peers from better-off families, who are ahead in their cognitive development. In sum, schools are thought to equalize student performance, because the learning opportunities that they offer are more crucial for children from disadvantaged families.

1.2.2 Do schools amplify inequality?

Arguing against the above position, Bourdieu and Passeron (1971) hold that the idea of education as the "great equalizer" that provides an avenue to social mobility is just part of the "illusion of equality of opportunity". Instead, educational opportunities are socially stratified. However, this stratification often remains hidden, as education is considered a legitimate means of social reproduction and status attainment (Bowles & Gintis, 1976; Solga, 2016).

Schools can contribute to reproducing or even magnifying inequalities, because children growing up in disadvantaged families often attend disadvantaged schools, whereas children growing up in advantaged families attend advantaged schools (Alexander, 2016; DiPrete & Eirich, 2006; Gamoran & Berends, 1987; Maaz, Trautwein, Lüdtke, & Baumert, 2008; Oakes, 1985). This is because children from diverse socioeconomic backgrounds often live in different neighborhoods and, moreover, higher-SES parents tend to choose schools more carefully and have access to better information and resources when doing so. In countries with

[1] Illustration by Paul Zwolak.

a differentiated education system, children from advantaged families are more likely to attend the highest school type or track, because they tend to perform better. Even if two children from different socioeconomic backgrounds have similar grades, advantaged parents are more likely to send their child to the highest school type or track (Boudon, 1974). Therefore, schools do not provide a common learning experience for all children.

How could inequality between schools magnify achievement gaps? The concentration of low SES-students in particular schools is equated with disadvantages in terms of peers, teachers, and instruction. In most countries, schools attended by low-SES students are not disadvantaged in terms of funding. A notable exception is the United States, where schools are partly financed through local taxes, leading to "savage inequalities" in funding (Kozol, 1991). In many countries, schools with high proportions of immigrants or students from poor families are offered additional resources. Nevertheless, schools that have large numbers of students perceived to be "difficult" face problems attracting good teachers (Gamoran & Berends, 1987). Consequently, the quality of instruction is lowered. Parents with high educational aspirations will try to avoid schools that are perceived to be of low quality and have problems attracting good teachers. This reinforces the concentration of disadvantaged students in these schools. Peer effects could adversely affect the school climate and lead to deteriorating motivation, influencing the quality of instruction. In schools with higher numbers of students from disadvantaged families and of seemingly lower ability, teachers tend to have lower expectations and reduce the pace of instruction. Students are taught to reproduce facts instead of engaging in reflective thinking (Gamoran & Berends, 1987). If, on the other hand, teachers perceive the majority of their students to be highly receptive to learning, they will have higher standards. Students internalize these standards, thus confirming the teachers' expectations (Rosenthal & Jacobson, 1968). Therefore, the argument is that inequality between schools in terms of teachers, peers, and instruction magnifies educational inequality.

1.2.3 Families and early skills as opposed to schools?

To sum up, schools may act as equalizers because they open up new worlds to children, and especially to children from disadvantaged families. Conversely, education can amplify inequality because instead of opening up new worlds, schools attended by children from different socioeconomic backgrounds constitute different worlds. There is agreement among those who consider schools as equalizers and those who think that schools reinforce inequality that schools make a difference, even though they disagree on the direction of this difference. However, focusing on schools and education policy could detract attention from the more fundamental problem relating to equality of educational opportunity, namely socioeconomic inequalities between families (Alexander et al., 2001; Berliner, 2013; Downey et al., 2004; Solga, 2012, 2014). There is another position that rejects a primary focus on schools. According to this view, children's early skills are important (Heckman, 2006; Merry, 2013).

1.3. Methodological challenges

Children's cognitive development is not only shaped by schools, but its effects are interwoven with families and with children's competencies and occur within a larger societal context. Therefore, conducting empirical research on the roles of families, schools, and education systems is methodologically challenging. As noted by Sørensen and Morgan (2000): "Social scientists have many theories about the influence of schools but often little evidence supporting these theories" (p. 137). Moreover, policymakers and parents alike are convinced about the importance of schools, but scientific evidence is scarce. There are at least four challenges, described below, associated with empirical research on the role of schools and families.

1.3.1 Measuring school outcomes

The first challenge relates to measurement. To assess the effects of schools, the potential outcomes of schooling need to be measured. Reasonably good measures are available for cognitive competencies and knowledge, and for labor market success (Sørensen & Morgan, 2000). However, many other qualities such as creativity, social skills, and the ability to question and reflect are not measured.

Even for competencies for which reasonably valid measures are available, notably reading, mathematics, and science competencies, the problem of measurement error arises, particularly when assessing the development of cognitive skills over time. Because measurements are never entirely accurate, test scores comprise one "true" component and one random component (Treiman, 2009). Groups of well-performing students in one test may include disproportionate numbers of students with a positive random component, whereas the opposite is true for groups of students with poor test results. Because this transitory component is random, in the next measurement, test scores will move toward the mean. This problem is known as regression to the mean (Jerrim & Vignoles, 2013; Treiman, 2009, pp. 97-98). This statistical artefact can hide the divergence in test scores between high- and low-performing students, which may be associated with tracking, for example.

Additional measurement problems along similar lines include ceiling and floor effects. These problems occur when some students are so advanced that their scores are close to the top score in the first test. Unless the next test includes more difficult items, it is not possible to measure whether these very high performing children have improved. Floor effects occur when a test is so difficult that the test performances of low-performing children, who all score near the bottom, cannot be distinguished. A comparative study to assess whether low-performing students gain more than high-performing students requires data where gains at the bottom are comparable to gains at the top "like equal stair steps" (Downey & Condron, 2016, p. 210).

1.3.2 Separating the influence of families and schools

Besides measurement, a second methodological challenge entails the interacting influences of families and schools on children's cognitive development, which makes it difficult to disentangle the interwoven contributions of these two environments (Sørensen & Morgan, 2000). Students are not randomly assigned to schools; their parents select schools depending on their educational aspirations, which are colored by their socioeconomic backgrounds. In addition, children from better-off families attend schools in better-off neighborhoods. Thus, families with higher education levels not only have more resources that allow them to provide better support for their children at home than those with lower education levels, but they also send their children to better schools. It is not clear whether the higher school achievement of children from these families compared with the achievement of their disadvantaged peers is attributable to greater levels of family support, the attendance of better quality schools, or both.

1.3.3 Interactions of the environment and children's competencies

Children's cognitive development is influenced not just by the learning environments in which they are raised, but it also depends on their own motivations and skills. For example, children who enter school well prepared may feel encouraged to learn, because they are good at reading and doing mathematics. Children's current competencies may also enable them to make better use of the learning opportunities they encounter at school. These competencies develop through the interaction between their genetic endowment and their social environment. Thus, at any given point in time, children's cognitive competencies reflect the interaction of genetic endowment and environment (Sørensen & Morgan, 2000).

1.3.4 Separating the effects of education systems and other societal characteristics

The characteristics of education systems and other societal characteristics are interwoven in practice. One reason for this interweaving is that social and education policies and the labor market structure are not independent of each other. Therefore, countries with greater inequalities between schools may also be countries with higher levels of socioeconomic inequality. Such a finding would have implications for the comparative literature. Specifically, the effects of schools and education systems may be overstated if other differences between countries are not accounted for (Berliner, 2013; Merry, 2013; Nolan, Whelan, Maitre, & Wagner, 2012). To sum up, disentangling the role of children's own motivation and skills, families, schools, and education systems is a challenging task to which I would like to contribute in this thesis.

1.4 Methodological approach

In this thesis, I address the question of whether a socioeconomically integrated education system provides better opportunities for children from disadvantaged families. Alternatively, inequalities between families rather than schools may be at the root of inequality of educational opportunity. A third possibility is that disadvantaged children could enter school with lower skill levels that are not remedied by schools.

To address the first question on whether low-SES students lack ability or whether they attend disadvantaged schools, I compare children whose socioeconomic backgrounds differ, but whose competency levels were similar at school entry. My aim is to assess whether low-SES children lag behind their peers from better-off families in primary and middle school even when they share similar skills at school entry. I would like to emphasize that I do not hold to a view that children's early test scores reflect their "innate" abilities." Children's competencies develop in interaction with their environment. In this study, I focus on the development of children's competencies in primary and middle schools in the United States.

To separate the effects of family and schooling, I compare learning during the summer to learning during the school year. During the summer, schools are closed, whereas during the school year, children spend their time in both their family and school environments (Alexander et al., 2001; Downey et al., 2004; Heyns, 1978).

Thus, I conjoin two strands of the literature: the literature on summer and school-year learning and the literature on whether high-performing children from disadvantaged families, who performed similarly to their peers from better-off families at school entry, subsequently lag behind the latter. My study's contribution to the literature on summer and school-year learning is to consider the role of children's competencies at the time of school entry. In doing so, it responds to the following questions. Do schools provide opportunities for bright children from disadvantaged families? Do high-SES parents succeed in supporting initially low-performing children so that they catch up over their school career (Bernardi, 2014)? I contribute to the literature on high-performing low-SES children by asking *why* they fall behind.

The second question that I address in this thesis is whether a socioeconomically integrated education system provides better opportunities for children from disadvantaged families or whether the real problem lies in inequalities between families. The literature on summer and school-year learning is mostly based on evidence from the United States. I contribute to this literature by investigating whether the effects of families and schools vary between countries. More specifically, I undertake a comparative study of the United States and Finland to examine whether the effects of schools depend on the socioeconomic segregation and differentiation of an education system. Whereas the US education system is one of the more socioeconomically segregated education systems compared to other OECD countries, Finland has one of the most integrated education systems (OECD, 2016). If it is true that schools have an equalizing effect in countries with low levels of segregation, they would be expected to have a greater equalizing effect in Finland than in the United States.

However, the United States and Finland vary in many other respects apart from their education systems. Therefore, I examine variations in summer-learning across these countries. As schools are closed during the summer holidays, studying summer-learning allows me to compare the effects of families on children's learning in the United States and Finland. During the school year, children attend school for part of the day. Therefore, how learning during the school year changes in comparison to learning during the summer can be attributed to schools. This research design enables a comparison of the effect of schooling in the two countries.

Last, to further investigate the role of socioeconomic segregation in education systems, I analyze changes in socioeconomic segregation and changes in students' performance over time. Key questions that I aim to address include the following. Do socioeconomically disadvantaged students benefit when an education system gradually becomes more socioeconomically integrated? What are the implications for students from better-off families? Is there a trade-off between excellence in education and educational opportunity? Or do children from better-off families perform well everywhere, whereas children from disadvantaged families depend more on school conditions and education systems?

1.3 Arguments

1.3.1 Not simply a lack of skills

In this thesis, I argue that children from socioeconomically disadvantaged families do not simply lack cognitive abilities. I find that high-performing but low-SES children, whose initial competencies were similar to those of their peers from better-off families, fall behind the latter during elementary and middle school. Children who performed well in an earlier test have proven their ability to be high achievers. Therefore, finding that low-SES children who perform well in early childhood fall behind over time indicates limited opportunities. This finding goes against the view of Herrnstein and Murray (1994), who held that bright children make it to ranks of the "cognitive elite" no matter what their family background is.

The notion that socioeconomically disadvantaged children do not simply lack cognitive skills is further supported by the fact that initially poorly performing children from privileged families catch up with their peers over their school careers. Consequently, low cognitive abilities at school entry do not necessarily mean low performance levels throughout students' school careers. My study of families' educational behavior reveals that parents whose children perform poorly at school try to compensate by providing extra support. High-SES families may be better equipped to help their children to catch up when they fall behind and may have more resources to do so than low-SES families (Bernardi, 2014; Bernardi & Grätz, 2015; Torche, 2016a, 2016b).

1.3.2 Schools are more important for low-SES children

In this thesis, I argue that socioeconomically integrated schools and education systems provide better learning opportunities for children from disadvantaged families. School characteristics are more decisive for children from socioeconomically disadvantaged families. Whereas high-SES students perform well regardless of their mean school-level SES, low-SES students learn more if they attend schools with a higher share of students from better-off families, but they learn less if they attend schools with many students from disadvantaged family backgrounds. The average SES of a school's student body only impacts on children's learning rates during the school year and not during the summer holidays. This indicates that students attending schools with a predominantly high SES-student body do not only come from families who chose a good school or who live in more advantaged neighborhoods; the effect of better schools is also evident. This effect is concentrated among low-SES students. Following from the above points, I argue that low-SES children benefit most from attending schools with students from better-off families.

1.3.3 Stronger overlap between families and schools in countries with segregated and differentiated education systems

Even though low-SES students benefit most from attending schools with high-SES students, , they normally attend schools where the intake of socioeconomically disadvantaged students exceeds that of high-SES students. Privileged families tend to live in privileged areas with high-quality schools, have better knowledge and resources to choose a high-quality school, and are more likely to send their children to a higher track school within differentiated education systems. Therefore, learning environments within families and schools are not independent of one another. Consequently, children from disadvantaged families tend to be cumulatively disadvantaged, because they generally attend disadvantaged schools.

In countries with segregated education systems such as the United States, or those with differentiated education systems, such as Germany, children from disadvantaged families are more likely to attend disadvantaged schools in terms of facilities, teachers, and peers. In addition, schools in these countries demonstrate greater variation in terms of student intake and instructional quality. In more integrated school systems such as that of Finland, schools differ less in terms of quality and student intake. Thus, the school learning environment is more independent of families' SES. Therefore, I argue that students from low-SES families do not face cumulative disadvantages to the same extent as they do in countries with higher levels of school segregation or differentiation in education.

1.3.4 No trade-off between equality of opportunity and excellence in education

I find that children from better-off families depend less on school conditions than students from disadvantaged families. They perform well across all countries, regardless of whether the education system has changed and become more socioeconomically segregated or mixed. This goes against the beliefs of many middle class parents who try to avoid sending their children to schools that have large numbers of low-SES or low-performing children. This also means that there is no trade-off between equality of opportunity and excellence in education. Because children from privileged families do not learn less in a more integrated education system and disadvantaged children learn more in such systems, both equality of opportunity and excellence can be simultaneously achieved.

To sum up, in this thesis I argue that socioeconomically integrated schools and education systems provide better opportunities for children from socioeconomically disadvantaged families. It is widely accepted that low-SES students lag behind their peers from more advantaged families when entering school. However, lack of cognitive abilities cannot explain why disadvantaged students at all levels of the competence distribution do not keep pace with their peers from better-off families in primary and middle schools. It is also widely accepted that families are crucial for children's cognitive development and that inequalities in cognitive development associated with families' socioeconomic background will always remain. However, schools and education systems can reduce or widen achievement gaps between students from different socioeconomic backgrounds.

1.4 Outline of chapters

To present a roadmap of this thesis, I provide a theoretical background and a literature review in the second chapter. In the third chapter, I investigate whether children from disadvantaged family backgrounds, whose initial performances were similar to their peers from better-off families, fall behind the latter. In the fourth chapter, I attempt to explain the findings of this investigation. Do they fall behind because they attend schools of lower quality or does this happen because of their disadvantaged family conditions? In the fifth chapter, I explore whether school effects vary between countries through a comparison of the United States and Finland. These two countries were selected, because whereas the United States has a socioeconomically segregated school system, the Finnish school system is socioeconomically integrated, with students from different socioeconomic backgrounds attending the same school together. In the sixth chapter, I analyze how changes in the socioeconomic inclusiveness of education systems affect equality of opportunity as well as excellence in education. The last chapter offers conclusions derived from the study. Further details on each of the empirical chapters are provided below.

Chapter 3 explores the question of whether highly able children from socioeconomically disadvantaged families fall behind their more advantaged but less able peers in terms of

cognitive performance during their schooling (Feinstein, 2003; Schoon, 2006) or whether this result is just a statistical artefact resulting from regression to the mean (Jerrim & Vignoles, 2013). I examine the cognitive development of US students aged 5–14 years using data from the ECLS-K 1999 study. I find that even after taking regression to the mean into account, children from disadvantaged families who showed a high level of achievement at the age of 5 years are unable to maintain these achievement levels to the same extent as their more privileged peers. By contrast, low-performing preschool children from advantaged families evidence improvement compared with their initially similarly performing peers from disadvantaged homes.

Chapter 4 examines the question of why children from socioeconomically disadvantaged families fall behind their peers from better-off families during their early school years in the United States. Do they fall behind because they receive less support at home compared with their peers or does this happen because they attend schools of lower quality? Comparing only children whose initial performances were similar ensured that emerging gaps did not reflect learning-begets-learning effects. To separate the effect of families and schooling, I compare learning during the summer holidays to learning during the school year. During the summer holidays, schools are closed and learning is shaped by non-school factors, mainly families. During the school year, learning is shaped by both families and schools. Using data from the ECLS-K 1999 study, I find that SES achievement gaps among children whose initial performances were similar widen during the school year and not during the summer holidays. This finding indicates that these SES achievement gaps widen because of inequalities that exist between schools and not between families. However, the school-based explanation cannot account for why SES gaps among children whose initial performances were similar mainly widen between low-performing children. My examination of families' educational behavior reveals that parents, whose children perform poorly at school, attempt to compensate by giving their children extra support. High-SES parents have more resources to provide this support and seem to be more successful at it than low-SES parents.

From a policy perspective, it is important to know whether schools can compensate for unequal family conditions or whether addressing socioeconomic inequalities between families would be a more effective policy to combat educational inequality. I contribute to this debate through a comparative study of the United States and Finland in Chapter 5. The PISA studies have shown that from an international comparative perspective, students in Finland perform well in reading, mathematics and science. US students, by contrast, perform less well, especially in light of the lower test scores of students from disadvantaged families. The question then is whether students from lower socioeconomic backgrounds in Finland perform well because they are exposed to low levels of poverty in Finland or because of the country's egalitarian education system. To answer this question, I compare learning rates during the school year, when learning is shaped by school and non-school factors, with those during the summer break, when learning is shaped just by non-school influences. The study covers children's reading and mathematics performance during kindergarten, the summer after kindergarten, and in grade 1 based on data obtained from the ECLS-K 1999 in the United States and from the Jyväskylä Entrance into Primary Schools Study conducted in Finland. I find that learning during the summer holidays is not influenced by parents' education in

Finland, whereas in the United States, gaps between children from different family backgrounds widen during the summer. The fact that summer learning is influenced exclusively by non-school factors, suggests that the lower degree of socioeconomic inequalities between families in Finland contributes to high educational equality in this country. In addition, Finnish students whose parents have a low education status catch up during the school year, whereas they are not able to do so in the United States. This suggests that schools in Finland play an equalizing role in relation to reading performance in contrast to schools in the United States.

Middle- and upper-class parents generally believe that school systems in which students from different socioeconomic backgrounds learn together in the same schools promote equality of opportunity but harm their children. In Chapter 6, I investigate this belief, making both a conceptual and a methodological contribution. Conceptually I broaden the concept of differentiation in education, arguing that not only formal differentiation but also more "hidden" forms of differentiation such as residential segregation or private schools could contribute to the segregation of students from different socioeconomic backgrounds within separate schools. Methodologically, I contribute to the debate by analyzing changes within countries, controlling for time-constant unobserved differences between them. Using five waves of PISA data for 35 countries for the period 2000–2012, I find that in education systems in which schools become more socioeconomically inclusive, students from disadvantaged families improve their performance. Students from better-off families perform well independently of whether the education system becomes more socioeconomically segregated or inclusive. Thus, there is no conflict between equality of opportunity and excellence in education. Rather, excellence can be improved through equality of opportunity without hindering advantaged students or top performers.

2. Theoretical mechanisms and empirical findings

To investigate the influence of families, schools, and early skills on children's competence development, here I introduce the mechanisms of cumulative disadvantage and compensatory advantage. Second, I sketch a theoretical background, locating schools within the contexts of families and society at large. Third, I review the literature. In light of identified gaps in the literature, I conclude the chapter with my hypothesis.

2.1 The concept of cumulative (dis)advantage

Cumulative disadvantage describes a process whereby initial inequalities, for example, those relating to competencies, income, or wealth grow over time (DiPrete & Eirich, 2006; O'Rand, 2009). DiPrete and Eirich (2006) distinguish between path-dependent and time-dependent cumulative disadvantage. Both path-dependent and time-dependent processes lead to the growth of inequalities over time.

2.2.1 Path-dependent processes of cumulative advantage

The idea behind path-dependent cumulative disadvantage is that the current level of a given resource causally influences its future level of accumulation. The notion of cumulative disadvantage is closely linked to the concept of path dependency in life course research. It suggests that certain events such as attending a lower track school lock in further life course trajectories. To sum up, the underlying idea of path-dependent cumulative disadvantage implies that an initial advantage at time t causally determines subsequent outcomes.

This can be formulated as:

$$Y_{it} = (1 + \gamma)Y_{i,t-1} + \beta' X_{it} + \epsilon_{it}$$

The fact that the level of resources at time t-1 appears on the right-hand side of the formula highlights the fact that previous outcomes causally condition subsequent outcomes.

A path-dependent process leads to growing inequality between social groups when the status variable affects the level of resources that are at the heart of the path-dependent accumulation process. The status variable augments the level of a given resource at time t-1 (as do other individual characteristics or random shocks). As this level of Y has a causal and growing effect on Y at future points in time, the status variable has cumulative effects.

1.2.2 Time-dependent accumulation processes

Time-dependent accumulation processes (or "simple CA" in the terminology of DiPrete and Eirich (2006)) lead to growing inequalities as a result of cumulative exposure to different conditions. For example, cognitive inequalities between two students could increase over time, because one student is cumulatively exposed to a supportive family, whereas the other is cumulatively exposed to a disadvantaged family. This is expressed in the formula below in which the outcome is associated with a time-dependent variable such as age, experience, or school grade (denoted by z in the equation). The quadratic term expresses accelerated development, whereas growth is constant and linear if ɣ2 = 0. The growth of the outcome is not affected by the history of its determinants such as random shocks. If a time-dependent process interacts with a status variable such as socioeconomic background, inequalities between different status groups grow over time.

$$Y_{it} = \gamma_1 z_{it} + \gamma_2 z_{it}^2 + \varepsilon_{it}$$

1.2.3 Compensatory advantage

Path-dependent processes of cumulative disadvantage are likely to vary by socioeconomic background: "An early disadvantage is likely to persist or grow larger over time for people from disadvantaged families, whereas it is likely to attenuate for those from more advantaged families" (Bernardi, 2014, p. 2). This phenomenon is termed compensatory advantage (Bernardi, 2014; Bernardi & Grätz, 2015; Torche, 2016a).

Expressed more formally, compensatory advantage means that the level of Y at time t-1 or exposure to a certain environment would differentially affect individuals from different socioeconomic backgrounds. Thus, the effect of a status variable would be interactively linked to a path- or time-dependent process of cumulative disadvantage. To sum up, processes of cumulative disadvantage could especially affect students from socioeconomically disadvantaged backgrounds.

2.2 Theoretical Background: Different processes of cumulative disadvantage in competence development

To clarify the roles of families, schools and children's own competencies for their cognitive development, I will now differentiate processes of cumulative disadvantage or compensation related to these three resources. Children interact with their parents and siblings within their families, with their teachers and peers at school, and with their peers within their neighborhoods. The resources and support available within these spheres shape children's

development and channel them along different developmental pathways. These spheres are embedded within a wider societal context .

2.2.1 Unequal childhoods

Children, especially small children, spend most of their time with their families. Families exhibit structural differences in the extent of support that they provide and how conducive they are to learning based on their levels of cultural, social, and financial capital (Bourdieu, 1983; Coleman, 1988). Lareau (2003) vividly portrays the resulting "unequal childhoods" and parents' differing conceptions of how to raise their children. Thus, *concerted cultivation* is a parenting style that is widely practiced by middle-class families. Accordingly, parents drive their children to organized afternoon activities such as music lessons or sports practice. They read to their children, monitor their development, and are involved in their children's educational activities. Parents communicate extensively with their children, having frequent discussions and seeking their children's opinions. Hence, children develop a wide vocabulary and are comfortable talking to adults and questioning authority. Working class parents, by contrast, also want the best for their children, but hold to the view that child rearing should facilitate the *accomplishment of natural growth*. Consequently, they let their children watch TV and play on their own with children in the neighborhood or with their extended family. They tell their children what to do instead of trying to persuade them. These different ways of raising children lead to inequalities in children's competence development.

In addition, low-SES children are more likely to encounter obstacles and difficulties such as parental divorce or financial stress, bad health, or being bullied at school. Conversely, high-SES children are less likely to encounter obstacles in their schooling and later lives. In addition, their parents are also better able to compensate for the obstacles and problems that they encounter (Bernardi, 2014; Grätz, 2015; Torche, 2016a, 2016b). For example, a high-SES child who is younger than his or her classmates may not initially perform well in school. In this case, the mechanism of compensatory advantage comes into effect, as the child's parents have the necessary resources and knowledge to compensate for his or her low performance (Bernardi, 2014; Bernardi & Grätz, 2015). They could be better able to provide homework support for their child, or pay for private tutoring. By contrast, the poor initial performance of low-SES children at school may initiate a path-dependent process of cumulative disadvantage. Their teachers may have lower expectations of them and they themselves may develop the conviction that they are not good at school.

To sum up, childhoods are unequal because of children's cumulative exposure to different family environments. This explains why children from different socioeconomic backgrounds commence schooling with different levels of skills. High-SES parents may be better able to compensate for any obstacle encountered by their children. The question of whether the effect of family background on students' cognitive development and educational decisions declines as they grow older and become more independent is a matter of debate (Cameron & Heckman, 1998; Jerrim & Vignoles, 2013; Shavit & Blossfeld, 1993).

2.2.2 The role of children's achievement levels at school entry

Drawing on the findings of neuroscience, Heckman (2006) suggests that the early years before children enter school are a "sensitive period" during which children's brains are the most plastic. Because children from families with unequal SES experience unequal childhoods, SES achievement gaps are already wide when children enter school (Waldfogel, 2004).

Introducing a model of "dynamic complementarity," Heckman (2006) argues that children's skills at school entry are the foundation for their learning progress in school. This model is based on two path-dependent processes of cumulative advantage. First, being-good at something reinforces one's motivation and interest. Therefore, the motivation to learn is self-reinforcing. Second, reading proficiency provides the foundation for further learning and enhances learning efficiency. By contrast, a child who has difficulties with reading may be discouraged from reading. Therefore, Heckman argues that skills beget skills.

Compared with low-SES children, high-SES children generally enter school with higher competencies (Waldfogel, 2004), and are therefore better prepared for school learning. If learning begets learning, then SES achievement gaps will widen over time. If the influence of families' SES mainly operates through a child's level of achievement at school entry, children from disadvantaged families who beat the odds and enter school with a high level of achievement would not be at a disadvantage compared with children with similar levels of achievement at school entry. This is because children with similar early cognitive competencies have the same capacity to avail of the learning opportunities they encounter at school, and they also experience the same processes of self-reinforcing motivation to learn (Raudenbush & Eschmann, 2015). If, however, cumulative exposure to socioeconomically disadvantaged family conditions continues to influence children's cognitive development, disadvantaged children will fall further behind their advantaged peers with similar achievement levels at school entry.

2.2.3 Within and between school effects

In addition to families and children's own skills, schools also affect the development of children's competence. Baumert, Nagy, and Lehmann (2012) distinguish *between*-school effects and *within*-school effects. Whereas the between-school effects result from cumulative exposure to unequal school contexts, within-school effects occur within the same schools.

Inequalities grow *within* schools when students' current skill levels, or parental support with homework enable them to make differential use of the learning opportunities they encounter at school (Raudenbush & Eschmann, 2015; Sørensen & Morgan, 2000). Conflict theorists argue that schools value middle-class competencies. Therefore, working class children are at a disadvantage at school, where they are required to write essays and discuss and present arguments to support their opinions (Lareau, 2003).

It is conceivable that socioeconomic and ethnic achievement gaps among students attending the same school increase, because they benefit differentially from instruction or are discriminated against at school. However, empirical results point in another direction: performance gaps between students from different socioeconomic backgrounds seem to widen mainly *between* but not *within* schools (Aikens & Barbarin, 2008; Ermisch & Del Bono, 2012). Thus, students attending the same school are provided with fairly similar learning opportunities, whereas learning opportunities vary among schools when school quality differs. To sum up, schools could be equalizers for students attending the same school, but they may stratify educational opportunities for children attending schools of differing quality.

2.2.4 Overlap between families and schools

Families do not just provide unequal learning opportunities; they also determine which schools children attend Therefore, the question "Are families or schools to blame for education inequality?" may not be the right one to ask, because it treats both institutions as separate entities (Alexander, 2016). In reality, conditions that apply to families, schools, and neighborhoods overlap and are not independent of each other. Children growing up in socioeconomically disadvantaged families tend to live in poor neighborhoods and attend disadvantaged and lower track schools. Thus, they experience path-dependent cumulative disadvantage. By contrast, children from more privileged families experience cumulative advantage, because their learning environment at home is supportive, they live in safe neighborhoods, and they attend high-quality schools.

2.2.5 Country variations in cumulative disadvantage

The extent of the overlap between families, schools, and neighborhoods differs from country to country. For example, in a country with highly segregated neighborhoods and schools such as the United States, children from socioeconomically disadvantaged families tend to live in poor neighborhoods and attend disadvantaged schools. Conversely, children from middle and upper class families grow up in privileged families and attend advantaged schools. This is true not only in countries with a segregated school system, but also in countries with a differentiated school system. Children from disadvantaged families generally attend lower track schools, so that in addition to experiencing a disadvantaged family environment, they face disadvantages at school. To sum up, in less segregated and differentiated education systems, children from disadvantaged families tend to attend the same schools as children from advantaged families. Hence, disadvantaged children attend high-quality schools, possibly compensating for their disadvantaged family conditions.

2.2.6 Is there a trade-off?

However, the question of how students from better-off families fare in an integrated school system remains. Many middle- and upper-class parents believe that a school system in which diverse students learn together in the same schools harms their children. This is because

teachers may need to reduce the pace of instruction or because motivation and the atmosphere at school could deteriorate. If this is true, a trade-off could occur. This raises the question of whether integrated school systems hamper socioeconomically advantaged and high-achieving students, while benefitting disadvantaged and lower-achieving students.

There are, however, arguments that oppose the view of a trade-off, suggesting that neither group of students loses out in an integrated school system. Disadvantaged students could benefit, while advantaged students would not learn less. For students from lower SES and migrant families, good learning opportunities at school could be especially important, because they could potentially compensate for less stimulating and supportive family environments (Alexander et al., 2001; Coleman, 1966). However, socioeconomically advantaged students may anyhow succeed in integrated and segregated schools alike. There are three explanations for this. First, in integrated schools, all students may benefit from an enriched classroom discussion encompassing more diverse perspectives. In addition, more advanced students may find themselves explaining what they have learned to less advanced students, which deepens their own understanding. Second, the motivation and performance of high-SES students may be more independent from the school they attend because their parents have high educational ambitions and support their children with homework. Third, advantaged parents may hold teachers responsible for their teaching. To sum up, children from privileged families may anyhow succeed and not be harmed by an integrated education system (Esping-Andersen & Wagner, 2012).

2.3 Empirical findings in the literature

2.3.1 The Coleman Report: Families matter most

The debate on the relative contributions of families and schools to educational inequality was fueled by the famous Coleman Report (Coleman et al., 1966). Coleman and his colleagues conducted a pioneering study on equality of educational opportunity in the United States requested by parliament in the Civil Rights Act. The Coleman Report was one of the outcomes of the struggle during this era to desegregate America's public schools (Alexander & Morgan, 2016). In this context, the Report was expected to show that resources were apportioned very unequally between "black" and "white" schools, which would explain, to a large extent, black-white achievement gaps.

Rather than focusing the investigation solely on the resources and funds that the government allocated to schools, Coleman wanted to investigate the outcomes of schooling. Therefore, he and his team not only gathered information about schools and teachers, but also administered achievement tests to 600,000 students distributed in 4,000 schools. The results showed that US schools were strongly segregated by race. Contrary to expectations, however, this segregation was not associated with substantial material differences between schools in terms of facilities such as libraries or laboratories.

The study found that only about 10–14% of the variance in students' achievement occurred between schools; most of the variation in achievement was within schools and could not therefore be explained by differences between schools. Instead, family characteristics were more strongly related to students' achievement than any of the measured school characteristics. Coleman and his colleagues concluded that families and not schools matter most for educational achievement.

However, there was more variation in the achievement of minority students between schools compared with that of majority students. About 20% of the achievement variance of minority students was associated with the school they attended. School characteristics were more strongly associated with students' achievement when students came from minority families. Thus, Coleman et al. (1966) concluded that: "This indicates that it is for the most disadvantaged children that improvements in school quality will make the most difference in achievement" (Coleman et al., 1966, p. 22).

The school factor that was most strongly related to students' achievement was the socioeconomic composition of the student body. The next most important school-related factor was the teachers' characteristics. Differences between schools in terms of their material resources were only marginally related to the students' achievement. This finding casts doubts on the value of a policy that only increases non-personal resources in disadvantaged schools. Instead, the results suggest that school integration across socioeconomic lines would increase the achievements of minority students.

The findings of Coleman et al. are summarized in the following quote from the Report:

> Schools bring little influence to bear on a child's achievement that is independent of his background and general social context; and this very lack of an independent effect means that the inequalities imposed on children by their home, neighborhood, and peer environment are carried along to become the inequalities with which they confront adult life at the end of school. For equality of educational opportunity through the schools must imply a strong effect of schools that is independent of the child's immediate social environment, and that strong independent effect is not present in American schools (Coleman et al., 1966, p. 325).

2.3.2 The problem with cross-sectional data

The study by Coleman and his colleagues was pioneering because they collected data on students' achievement long before the PISA study was introduced. However, because the study was cross-sectional in design, it was not possible to separate selection effects from the effects of schools (Sørensen & Morgan, 2000, p. 153ff). Students are not assigned randomly to schools. Instead, families choose schools and neighborhoods. Therefore, it is not possible to distinguish the specific factors explaining why students from disadvantaged families perform better in schools with a more favorable student body composition. It is not clear whether this is because they benefit from the school quality, or because they were already performing better than their peers from similar backgrounds at the time of school entry. Students from

disadvantaged families attending schools with more advantaged peers may have ambitious parents or they may be especially bright.

Consider, for example, two children with low-SES parents (measured in our data). One of the children has parents who value education highly (this is not measured in our data) and consequently performs well. This student's parents are very careful in selecting a school, and send him or her to a school in a good neighborhood. A researcher conducting a study of these students would assess whether the mean SES of the students attending the school was correlated with students' outcomes. Based on this assessment, the researcher would conclude that there is a correlation between the mean school SES and students' performance. This could be valid. However, it is also possible that the low-SES student with ambitious parents would have succeeded in another school. Because this student's parents are ambitious, they would have always prioritized homework and working hard, and they would have supported the child regardless of which school he or she attended. Controlling for students' SES would not solve the problem that families choose schools, as this does not capture the fact that some parents value education highly, whereas others do not. One possible solution is to use longitudinal data in which students' performance is measured before they enter school. If they learn more in one school than they do in another, this would support the premise that the school where children learn more is the better school.

Longitudinal data enable scholars to address the question of whether students from disadvantaged families lack competencies at school entry or whether they fall further behind their advantaged peers throughout their schooling. Here I present a literature review that addresses this question. The first strand of the reviewed literature focuses on the role of children's competencies at school entry. The second strand compares summer and school-year learning to separate the effects of families and schools. The third and final strand of the reviewed literature focuses on the role of school differentiation and segregation.

2.3.3 When do SES achievement gaps emerge?

According to Bradbury, Corak, Waldfogel, and Washbrook (2015a), approximately 60 to 70% of SES achievement gaps found between students aged 14 years can be traced back to initial differences at the start of school. About 30 to 40% can be attributed to further divergence during the years of schooling until the end of middle school. Other data sources have also revealed divergence during the years of schooling. Cunha and Heckman (2010) report increasing achievement gaps between children aged 6 to 12 years from families with unequal incomes based on an examination of data from the National Longitudinal Survey of Youth (NLSY) for the United States. Feinstein (2003)'s study, which draws on the 1970 British Birth Cohort study, highlights increasing achievement gaps between children aged 2 to 10 years from different socioeconomic backgrounds. However, studies by Blanden, Katz, and Redmond (2012) and the Centre for Longitudinal Studies (2014), based on more recent data from the Millennium Cohort Study for the UK, do not find any increase in inequalities between children aged 3 to 11 years in relation to their parents' education. To sum up, most studies find that SES achievement gaps are already significant when children enter school, widening further over the period of schooling.

Just because achievement gaps widen during children's schooling years does not mean that schools are the underlying cause. Competence development simultaneously reflects the effects of families, schools, and skills. To reveal the underlying mechanisms, I next examine the role of children's competencies at school entry.

2.3.3.1 The role of children's competencies at school entry

Following Heckman's argument that skills beget skills (see section 1.6.2), it can be predicted that the learning progress is most pronounced among high-performing students. This projection is contrary to the findings of most studies that have investigated learning over a longer period of time. These studies find that learning progress is greatest among low-performing children. Based on their investigation of learning rates of students in grades 1 to 11 in the United States, Bloom, Hill, Black, and Lipsey (2008) show that learning rates tend to be highest in the early years of schooling, slowing down as children grow older. In their study conducted in Finland, Leppänen, Niemi, Aunola, and Nurmi (2004) find that achievement gaps in reading increase during preschool, but decline once children enter school. Their conclusion is that systematic instruction is most beneficial for children who start schooling with low performance levels. None of these findings support a path-dependent process of cumulative disadvantage in which skills beget skills once children are in school.

Socioeconomic background and achievement levels at school entry are intertwined because, on average, students from disadvantaged families perform worse than students from advantaged families. One way of disentangling both is to compare students whose achievement levels at school entry are similar but whose socioeconomic backgrounds differ. This was first done by Feinstein (2003) with data from the 1970 Birth Cohort Study in Great Britain. He found that initially high-performing children from disadvantaged families fell behind their advantaged peers whose performances at school entry were similar. Children from privileged families, whose initial performance was poor, caught up over time. As a result, the latter group overtook the former group over time. Feinstein's conclusion was that children's socioeconomic background has a more decisive influence on their developmental trajectories than their early skills do. Other British studies for cohorts born in 1958, 1970, and 2000 (Blanden et al., 2012; Schoon, 2006) and US studies (Bradbury et al., 2015a) have similarly shown that low-SES children are left behind.

This finding counters the perception that low-SES children often do not have the potential to do well in school, or that educational inequalities have genetic causes (Herrnstein & Murray, 1994). Children who performed well in earlier tests have proven their abilities to become high achievers. The finding that low-SES children perform well during early childhood but do not succeed in school therefore suggests that limited opportunities are the cause.

2.3.3.2 Just a statistical artefact?

However, the finding that low-SES children fall behind has not gone unchallenged. Jerrim and Vignoles (2013) argue that low-SES children do not fall behind their peers from better-off

families. Instead, the authors claim that this is just a statistical artefact caused by regression to the mean. The group of students who perform well in one test includes a disproportionate number of students with a positive random component; the group of students who perform poorly in the test includes a disproportionate number of students with a negative random component. This random component reflects lucky or unlucky guessing, having a good day or being familiar with a certain test item. Because these transitory components are random, those with a high (positive or negative) random component will move toward the mean in the second measurement. Jerrim and Vignoles argue that the regression-to-the-mean effect is stronger for students situated further away from their group mean. This includes "unusual" high-performing students from disadvantaged families and poor-performing students from advantaged families. The authors claim that a disproportionate number of high-performing preschool children from disadvantaged families did not actually perform well in the first test but were just lucky guessers, whereas many low-performing preschool children from advantaged families simply had a bad day in the first test. In sum, Jerrim and Vignoles (2013)agree that even at early ages, high-SES children perform better on cognitive tests than low-SES children. What they dispute, however, is whether children from disadvantaged families fall further behind their peers from better-off families.

This position is aligned with that of scholars who argue that students from disadvantaged families lack abilities (Herrnstein & Murray, 1994). Their argument implies that students from disadvantaged families, who perform well at school entry, will perform as well as high-performing students from advantaged families throughout their school careers. To sum up, scholars are still debating whether disadvantaged children are outpaced by their advantaged peers during their schooling years.

2.3.3.3 The roles of families and schools

One question that remains under-researched in the literature on whether students whose initial performances are similar develop differently, depending on their socioeconomic background, asks *why* their performance trajectories may diverge. Why do children from disadvantaged families fall behind their peers from better-off families throughout their schooling? To address this question, researchers have compared achievement gaps before and after children's school entry across countries and within and between schools.

SES achievement gaps between children prior to school entry are wider in the United States than in Canada, Australia, and Great Britain (Bradbury, Corak, Waldfogel, & Washbrook, 2011; Merry, 2013). This finding supports the argument that significant SES achievement gaps in the United States are the outcome of inequalities between families, unequal welfare policies, and the private preschool system and are not a result of inequalities between schools.

This position is further supported by studies that have compared how SES achievement gaps develop before and after children's entry into primary school. According to Feinstein (2003) and Blanden et al. (2012), the rate at which achievement gaps expand does not change when children enter school. Therefore, the authors' conclusion is that schooling does not alter the growth of SES-achievement gaps. Instead, they argue that the widening of achievement gaps

is the result of unequal family conditions. However, it is difficult to compare how achievement gaps develop during the early years before children enter school.

Another way to assess the role of schools is to examine how much of the expansion in SES achievement gaps is associated with the different schools that children attend, and how much of the performance divergence arises between children attending the same school. According to Bradbury et al. (2015a, p. 26), about half of the extent of divergence between children from different socioeconomic backgrounds can be attributed to differences between schools, while the other half develops within schools. The association of SES achievement growth within and between schools indicates that "school and teacher resources do indeed 'make a difference,' although the contribution of specific measured characteristics of schools and teachers is difficult to detect" (Gamoran & Long, 2007, p. 8). To further examine the effects of families and schools on children's cognitive development, I now turn to the literature on summer and school-year learning. This literature has contributed to the disentangling of the effects of families and schooling, but it does not account for the role of children's competencies at school entry for the generation of SES achievement gaps.

2.3.4 Summer and school-year learning: Do schools act as equalizers?

As previously discussed, longitudinal data make it possible for scholars to distinguish between achievement at school entry and learning thereafter. Researchers solely interpret changes in SES achievement gaps during students' school careers as school effects. This is especially the case if students' achievement gaps develop between schools. However, as children are cumulatively exposed to unequal learning environments at home, existing gaps between them could widen even if they all receive the same learning opportunities at school. In addition, "the reason we do not find strong evidence of widening disparities as children age may be that in most countries education policy does to some extent reduce (or at least not increase) SES disadvantages throughout school" (Ermisch, Jäntti, Smeeding, & Wilson, 2012, p. 18). Thus, disentangling the interwoven influences of families and schools poses a challenge.

One way of distinguishing between the influences of families and school is to perform a "natural" experiment featuring the summer holidays (Heyns, 1978). During the summer holidays, schools are closed and children's learning is therefore solely influenced by non-school influences, notably families and neighborhoods. Learning that takes place during the summer holidays can be used as a baseline to estimate how children's achievement would progress if there were no schools. The change observed between the summer and the start of the school year is then interpreted as the effect of schools.

A key finding of the summer learning literature is that all children learn more during the school year than during the summer holidays. During the school year, the learning rates of children from different socioeconomic backgrounds are parallel. However, SES achievement gaps widen during the summer holidays, because the progress made by low-SES children in reading and mathematics is minimal, and they even forget some of the material that they previously learned. By contrast, high-SES children continue to learn during the summer,

albeit at a slower pace than during the school year. Thus, schools make more difference in learning for children from disadvantaged families. The conclusion that arises from this finding in the literature is that without schooling, SES achievement gaps would further widen. These increasing gaps mainly reflect inequalities between families, because they develop during the summer holidays.

The above described patterns have been found in studies using data for children in Atlanta in grades 6 and 7 (Heyns, 1978) and for children in Baltimore in grades 1 to 5, (Alexander, Entwisle, & Olson, 2007). Moreover, they have been replicated using a nationally representative data set for the final preschool year and grade 1 (Downey et al., 2004). Whereas the earlier regional studies from Atlanta and Baltimore found that all (Baltimore) or nearly all (Atlanta) of the growth in SES achievement gaps occurred during the summer, Downey et al. (2004) found that the widening of these gaps during the school year was less than half of what it was during the summer. Multilevel models reveal that these milder effects of SES on learning rates during the school year take place between schools and are thus attributable to differences between schools.

Though few studies have been conducted on learning during the summer and school year outside of the United States, existing studies indicate lower inequality levels among families in European countries and the stronger compensatory effects of schools. Based on a study of a small sample of Swedish students in Stockholm in grades 5 and 6, (Lindahl, 2001) concludes that SES does not influence summer or school-year learning. This finding is contrary to those of studies in the United States, indicating lower inequality levels between families and between schools in Sweden. Low SES students with non-Swedish parents fall behind in mathematics during the summer holidays. Conversely, during the school year, these students catch up with their peers, indicating the compensatory effect of schools. Contrasting with the findings of the US research, schools not only help to slow down the growth of inequality, but they may even contribute to reducing achievement gaps between students. The findings of a study conducted on children in the final year of kindergarten and grade 1 in the Flemish part of Belgium (Verachtert, Van Damme, Onghena, & Ghesquière, 2009) are similar. These studies indicate that schooling may potentially reduce as well as curb the growth of inequalities.

To sum up, when it comes to inequality of educational opportunity, the summer learning literature suggests that schools are "more 'part of the solution' than 'part of the problem'" (Alexander, 1997, p. 16). This is the case for the United States, even though inequalities between schools are high. This compensatory effect of schooling can likely be attributed to the poorer learning environments within low-SES families during the summer holidays compared with the learning environment of students from these families during the school year.

2.3.5 Formal differentiation: Are schools stratifiers?

Whereas the summer learning literature argues that schooling has an equalizing effect on SES achievement gaps, the literature on differentiation and segregation argues that differentiated education systems and segregation between schools increase SES achievement gaps. However, given that the United States has one of the most segregated education systems in the OECD, how can these findings be reconciled? I will first review the literature on differentiation and segregation before discussing how it relates to that on seasonal learning.

2.3.5.1 Formal differentiation

Differentiation refers to the separation of students into different school types, tracks, or groups according to their assumed interests and abilities. Tracking is intended to help teachers target their instructions to the needs of their students through the creation of homogenous groups. Many parents think that this approach enables high-performing children to move ahead without being slowed down by weaker students. At the same time, teachers may be better able to target instruction for lower performing students when these students learn in separate tracks. However, separating low-performing students can create disadvantageous learning environments in which students' motivation deteriorates and teachers focus on imparting facts instead of fostering reflective thinking and creativity (Gamoran & Berends, 1987). Thus, a trade-off may occur. An integrated school system may help low-performing students and those from disadvantaged families, whereas a differentiated education system may boost the performance of high-performing children.

2.3.5.2 Formal differentiation and socioeconomic segregation between schools

Differentiation creates socioeconomic segregation according to school types. There are two reasons for this. The first is inequality in performance, whereby students from disadvantaged families perform worse on average than their peers from advantaged families. The second is inequality in educational decisions, with parents' educational decisions varying by socioeconomic background, even when their children perform at similar levels (Boudon, 1974). High-SES parents try to send their children to schools in the highest track, even if their children do not perform so well. Because of these two types of inequality, students from disadvantaged family backgrounds are concentrated in the lower school types or tracks. Therefore, educational differentiation may not only exacerbate inequalities between high- and low-performing students, but it may also exacerbate inequalities between children from different socioeconomic backgrounds. If differentiation creates disadvantaged schools, this will mainly hurt children from socioeconomically disadvantaged families.

2.3.5.3 Increasing achievement gaps between tracks

The conclusion derived from studies using longitudinal data and comparing learning trajectories in different tracks is that achievement gaps between students in higher and lower tracks increase over time (Baumert, Stanat, & Watermann, 2006; Kerckhoff, 1986; Maaz et al., 2008). This is because students in the higher tracks learn more than students in the lower tracks. However, the question that arises is whether this is because of the tracks or because of students' characteristics.

2.3.5.4 Methodological challenges

Assessing the effects of tracking is methodologically challenging, because students are not randomly allocated to tracks. Instead, they are allocated to different tracks precisely because of their different achievement levels, ambitions, and levels of parental support. Unequal learning rates within different tracks may be caused by the characteristics of the tracks themselves, but they may also be caused by preexisting differences among the students attending different tracks. Attending different tracks makes a difference for students' achievement if instructional quality between the tracks is unequal (Gamoran, 2010). Instructional quality is shaped by the quality of teachers, the student body composition. the curriculum or educational standards, and teachers' expectations (Baumert et al., 2006). However, even before students are tracked, they are on different achievement trajectories. This is one reason why they are placed into different tracks in the first place. Thus, their achievement trajectories might have diverged even further without tracking. For example, compared with students in lower tracks, those in the higher tracks could make better use of the learning opportunities in school because they have higher skill sets, and they may spend more time and invest more effort in completing school tasks. Moreover, their parents may be highly ambitious. Therefore, it is methodologically difficult to disentangle the effects of tracking from preexisting differences between students.

2.3.5.5 Different differentiation practices within countries

One way of studying tracking is by examining institutional variation. For example, Kerckhoff (1986) and Fend (2009) conducted studies of England and Germany in the 1960s, where both comprehensive and tracked schools coexisted. This allowed them to compare how students fared in tracked and comprehensive schools. In tracked schools, students in the higher tracks learned more, and those in the lower tracks learned less than students in comprehensive schools, whose initial performances were similar (Kerckhoff, 1986). According to Kerckhoff (1986), this finding applies to both within-school and between-school tracking. Most studies show that tracking tends to increase inequality among students, but without increasing their average achievement levels (Gamoran, 2010). Based on an examination of the effects of tracking on inequality of educational opportunity, Fend (2009) finds that students'

competencies are less related to their socioeconomic origins within comprehensive schools than they are within tracked schools.

However, in systems entailing the coexistence of all school types, parents can choose whether to send their child to a comprehensive school or to a higher or lower track school. Many ambitious parents will choose to send their children to a higher track school, and not to a comprehensive school. Therefore, it remains difficult to estimate the effect of tracking in these settings. Another approach is to compare countries with different education systems or to evaluate institutional reforms that reduce or postpone tracking.

2.3.5.6 Comparative studies on differentiation

Within the literature encompassing comparative studies, differences in education systems are related to variations in inequality of educational opportunity and in students' performance (Blossfeld, Triventi, Skopek, Kulic, & Buchholz, 2016; Le Donné, 2014; OECD, 2016; Shavit & Blossfeld, 1993; Van de Werfhorst, 2015; Van de Werfhorst & Mijs, 2010). The main finding derived from this literature is that in countries where children are separated at an early age into different school types, students' test scores in international student assessments such as the PISA, TIMSS, or PIRLS are more strongly influenced by their socioeconomic background (Hanushek & Woessmann, 2006; Horn, 2009; Le Donné, 2014; Van de Werfhorst & Mijs, 2010). Thus, formal differentiation seems to increase inequality of educational opportunity.

Researchers can use data from the student assessments to assess possible trade-offs between equality of opportunity and performance. In countries where educational tracking occurs early, students do not perform better on average than students in countries where tracking occurs later—if anything, they perform worse. Thus, the comparative literature finds no trade-off between equality of opportunity and a high performance level. Later tracking benefits socioeconomically disadvantaged students without affecting students from advantaged families. This indicates that the characteristics of schools and education systems are especially important for the performance of students from disadvantaged families. By contrast, children from privileged families may succeed anywhere, independently of the institutional design of an education system (Blossfeld et al., 2016).

2.3.5.7 Difference-in-difference

The comparative literature does not take into account that the characteristics of education systems may be related to other characteristics of countries such as the level of socioeconomic inequality. For example, countries with higher levels of socioeconomic inequality may have more differentiated education systems (Chmielewski & Reardon, 2016). To account for unobserved country characteristics, Hanushek and Woessmann (2006) compared inequality in pre-tracking student performance in primary schools with inequality in student performance at the end of lower secondary school. By the latter stage, students in countries where tracking is practiced are already attending tracked schools, whereas students in countries with

comprehensive lower secondary schools are still attending comprehensive schools. According to the findings of these authors, the increase in inequality in students' performance across different countries is greater in tracked education systems than it is in comprehensive school systems. This is because low-performing students in tracked systems fall further behind. There is no evidence that high-performing students show more improvement in tracked education systems.

Hanushek and Woessmann (2006) did not investigate the effect of tracking on inequality of educational opportunity, because they lacked a comparable indicator of students' socioeconomic backgrounds across the two studies. Using a difference-in-difference design, they controlled for time-constant unobserved country differences. Inequality in primary school served as the baseline. Any constant unobserved country-based differences would already be affecting inequality at that time. The authors only compared changes in inequality between the tracked and the comprehensive systems in the different countries. However, the underlying assumption of their research strategy was that the samples of primary and secondary school students were comparable. Yet, according to Jakubowski (2010) this assumption may not hold true, because the TIMSS and PIRLS sample students by grade, whereas PISA samples students by age. Therefore, studying the effects of educational reforms may be more insightful for assessing the effects of tracking.

2.3.5.8 Education reforms

Several studies have examined the effects of educational reforms on students' competencies. Kerr et al. (2013) analyzed the effects of the Finnish school reform that postponed tracking from the age of 10 years to 15 years. The authors used a difference-in-difference approach, which exploits the gradual implementation of the reform. To measure cognitive competencies, the authors used test scores obtained from a cognitive test taken at the beginning of the mandatory military service. After tracking was postponed, students whose parents did not have a high school diploma scored higher on the test than comparable students who attended tracked schools. Students whose parents were more highly educated did not score worse after the reform than comparable students before the reform. The achievement gap relating to parents' education was reduced by one-quarter after the reform. The conclusions of a study by Jakubowski, Patrinos, Porta, and Wiśniewski (2010) on the Polish education reform that postponed tracking by one year are similar. To sum up, researchers who have used a variety of methodological approaches agree that between-school tracking increases inequality of educational opportunity without any gains for high-performing or advantaged students.

2.3.6 Hidden forms of differentiation: Socioeconomic segregation between schools

2.3.6.1 Socioeconomic segregation as "hidden" differentiation

Conceptually, the studies presented so far focus only on formal differentiation, leaving aside more "hidden" forms of differentiation. For example, they classify both Finland and the

United States as having comprehensive education systems. However, though students are differentiated only at the age of 16 years in both Finland and the United States, Finland stands out among OECD countries as having the most socioeconomically inclusive education system, whereas the US education system is one of the most socioeconomically segregated (OECD, 2013b). This is likely because even in comprehensive education systems, middle- and upper-class parents find ways to differentiate their children from others and to ensure that they attend high-quality schools. They live in privileged neighborhoods and are able to send their children to the best schools. To sum up, because of formal and informal differentiation within secondary education, students from varying socioeconomic backgrounds and with varying abilities attend different schools.

2.3.6.2 The associations of family and school characteristics with learning rates

The findings of the Coleman Report suggest that the socioeconomic composition of schools is is associated with students' performance (Coleman et al., 1966). However, as discussed above, the findings of this study rely on cross-sectional data, which does not allow researchers to differentiate school effects from school selection. Therefore, the findings from longitudinal studies and from an experiment on housing allocation are presented below.

Aikens and Barbarin (2008) analyzed both reading scores at kindergarten entry and subsequent learning in kindergarten and elementary school in the United States. Their analysis of the Early Childhood Longitudinal Study-Kindergarten Class (ECLS-K) of 1999 revealed that family characteristics were the strongest predictor for children's test scores at kindergarten entry. By contrast, for subsequent learning rates, school and neighborhood characteristics were stronger predictors than family characteristics (Aikens & Barbarin, 2008, p. 235). This finding is supported by those of Rumberger and Palardy (2005), who analyzed learning rates in US high schools from grades 8 to 12. Using the National Educational Longitudinal Survey of 1988, they found that the school's average socioeconomic status had as much impact on students' achievement gains as their own socioeconomic status. Thus, researchers find larger school effects when analyzing achievement growth with longitudinal studies than they do when analyzing achievement gaps in cross-sectional studies. Cross-sectional achievement gaps reflect the influence of earlier contexts such as the years spent by children within their families before school entry. Learning that occurs when students are in school, by contrast, is more directly shaped by schools.

2.3.6.3 Housing policy is school policy

Another approach used to examine the effects of attending advantaged or disadvantaged schools is random public housing allocation. For example, the public housing policy of Montgomery County, Maryland, in the United States requires real estate creators to set aside a portion of the apartments or homes that they build for the public housing program that targets poor households. This policy has allowed thousands of households below the poverty line to live in affluent neighborhoods and send their children to schools that are mainly attended by students from middle- or upper-class families. Schwartz (2010) followed the trajectories of

850 children whose families were randomly allocated to public housing apartments. She was therefore able to compare how students who live in public housing fare in low-poverty and high-poverty settings. She found that public housing students in schools with few students from poor families outperformed public housing students in schools with large proportions of students from poor families. Consequently, public housing students in low-poverty schools were able to catch up with their non-poor peers. Consequently, the achievement gap at the beginning of elementary school was reduced by half by the end of elementary school.

Remarkably, attending a low-poverty school is more beneficial than attending a high-poverty school that receives additional funding. In addition to combating disadvantage through its public housing program, Montgomery County invested an extra US$2,000 per student attending the most disadvantaged schools. The money was used to reduce class sizes, equip teachers with professional development, and allocate more time to math and literacy. "Despite these investments, children living in public housing enrolled in low-poverty schools still performed better over time than public housing children in these extra resource schools" (Schwartz, 2012, p. 3).

2.4 Gaps in the literature

The summary of the literature revealed that fifty years after the publication of the Coleman Report, the debate on the roles of families and schools in determining achievement inequality continues (Alexander & Morgan, 2016; Downey & Condron, 2016). In this section, I bring together the three strands of literature that have been presented in this chapter. The first addresses the role of children's competencies at school entry. The second compares learning during the summer holidays to learning during the school year to disentangle the effects of families and schools. The third strand focuses on the effects of differentiation and segregation on students' learning. I identify the achievements and the gaps in the literature to which I would like to contribute.

The literature on summer and school-year learning engages in a comparison of learning rates during the school year and during the summer holidays (Alexander et al., 2001; Downey et al., 2004; Heyns, 1978). It reveals that achievement gaps between children from different socioeconomic backgrounds can be mainly attributed to inequalities between families. This argument is based on the finding that achievement gaps between children from different socioeconomic backgrounds widen during the summer holidays when schools are closed compared with gaps observed during the school year. All children gain from schooling as compared to staying at home, but low-SES students gain the most. This indicates that the difference between the quality of the learning environment at home and that at school is greater for low-SES students than it is for high-SES students. Schooling thus opens up new horizons for low-SES students and compensates for a disadvantaged family environment, at least partially. These findings support the view that schools are equalizers (Mann, 1848).

The literature on summer and school-year learning makes an important contribution to efforts to separate the effects of families and schools, thereby explaining the generation of

educational inequality. However, it does not take into account children's competencies at school entry, parents' activities with their children, and inequalities between schools and education systems. Consequently, several processes of cumulative disadvantage at the level of children, families, and schools are not addressed. In the following section, I will discuss these shortcomings.

2.4.1 Gap 1: Children's competencies at school entry

There is no attempt to disentangle the effects of competencies at school entry and children's socioeconomic backgrounds within the literature on summer and school-year learning. A child's capacity to benefit from instruction could depend on his or her current competencies (Raudenbush & Eschmann, 2015; Sørensen & Morgan, 2000). Children's existing competencies upon entering school constitute the foundation for their future learning (Heckman, 2006). As high-SES children's home environments are more favorable for learning, they tend to enter school with higher competencies than low-SES children. These competencies may enable them to benefit more from instruction in school than do low-SES children. At the same time, this means that smart low-SES children with similar competencies to those of their peers from high-SES families may not be at a disadvantage at school entry. The literature on summer and school-year learning does not take into account the role of children's skills at school entry in the creation of SES achievement gaps. This is investigated within the second strand of the literature that I consider here. This strand focuses on whether children from disadvantaged families fall behind their peers from better off families over their school career (Blanden et al., 2012; Feinstein, 2003; Jerrim & Vignoles, 2013; Schoon, 2006). However, this strand of literature does not investigate the reasons *why* children from disadvantaged families fall behind.

2.4.2 Gap 2: Parents' activities with their children and compensatory advantage

A second gap in studies on summer and school-year learning relates to their lack of attention to parents' activities conducted with their children. Comparisons of summer and school-year learning aimed at separating the effects of families and schools rely on the assumption that family environments remain the same during the summer and school years (Downey & Condron, 2016). However, if their children perform well, high-SES parents may relax during the summer holidays, but revert to supporting their children more intensively during the school year. This would violate the assumption on which the comparison of summer and school-year learning relies. In addition, the mechanism of compensatory advantage predicts that high-SES parents make particular efforts to boost their low-achieving children's performance (Bernardi, 2014; Torche, 2016b). Consequently, the reasons why children from disadvantaged families fall behind may differ for high- and low-performing children. To conclude, families are treated as black boxes in this literature, even though studies on compensatory advantage suggest that parents' education-related activities conducted with their children depend on their SES and on whether their children struggle in school.

2.4.3 Gap 3: Inequalities between schools and country variation

Schools are the third insufficiently explored area in the literature on summer and school-year learning. The literature on differentiation and segregation, by contrast, draws attention to the fact that schooling does not have the same meanings for children from different socioeconomic backgrounds (Alexander, 2016). Children from advantaged families attend advantaged schools, whereas children from disadvantaged families attend disadvantaged schools. Therefore, disadvantaged children tend to be cumulatively disadvantaged in both spheres: families and schools. A key finding of the literature on differentiation and segregation is that educational differentiation and school segregation increase inequalities between schools and therefore increase inequality of educational opportunity (Van de Werfhorst, 2015; Van de Werfhorst & Mijs, 2010; Woessmann, 2009).

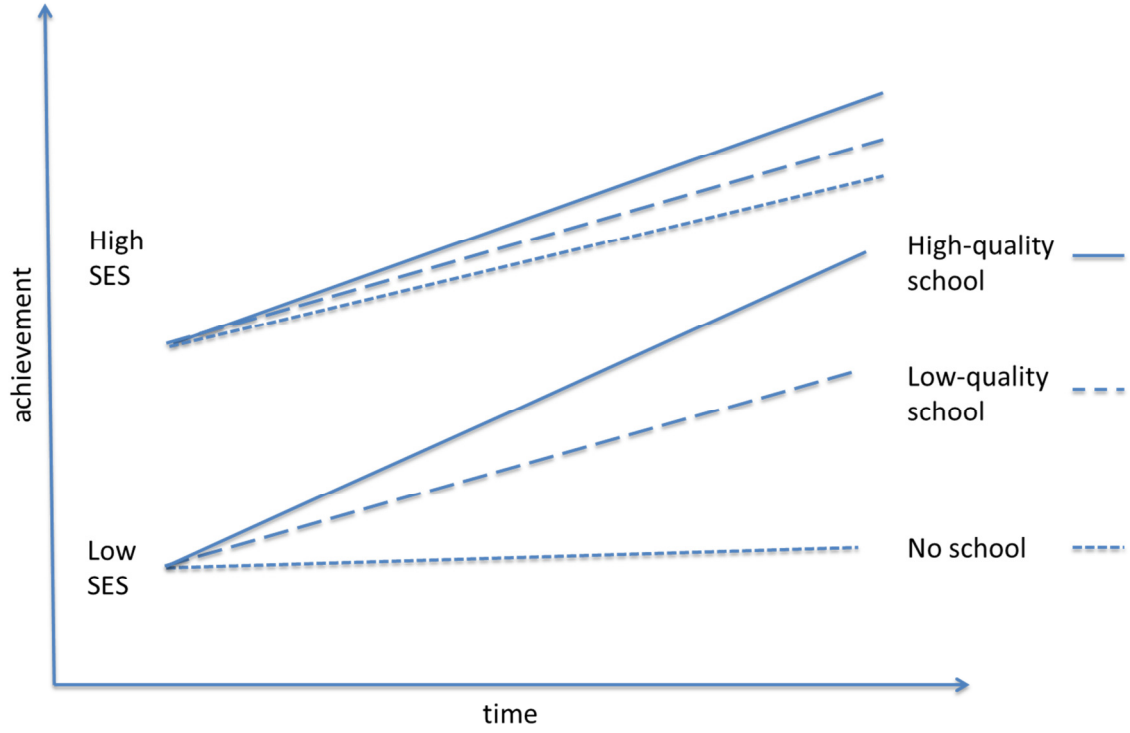
How is it possible to reconcile findings that, on the one hand, inequalities between schools contribute to inequalities in performance and, on the other hand, schooling equalizes performance? To bring together these seemingly contrary positions, it is important to understand that they refer to different counterfactual comparisons (Torche, 2016a). The literature on school segregation and differentiation compares the effect of sending a child to school A and not to school B. This is also what parents consider when they select a school for their child. The summer learning literature asks a more general question: Does attending school, as compared to staying at home, make a difference in the first place?

The summer learning literature finds that schooling, as compared to staying at home, has a (slight) equalizing effect, even in a country like the United States where considerable inequalities exist between schools. Thus, even if a child from a disadvantaged family attends a disadvantaged school, school attendance nonetheless brings about improvements in learning compared with not attending school at all. This improvement is greater for children from disadvantaged families than for those from advantaged families. Hence, schools can be equalizing even though there are inequalities between schools. This also points to a shared finding in the literature on seasonal learning patterns and on differentiation and segregation, namely that schools are more crucial for students from disadvantaged families. To sum up, schooling is an equalizing force even if disadvantaged students attend schools of lower quality than those attended by advantaged students.

The literature on tracking and segregation draws attention to the consequences of attending a high-quality or a low-quality school. In Figure 2.1, I attempt to integrate this finding with the findings from summer and school-year learning. To do so, I distinguish three hypothetical scenarios. Contrasting with the literature on summer and school-year learning, I do not simply distinguish “no school” versus “schooling”; I further differentiate between attending a high-quality or a low-quality school. Figure 2.1 shows that achievement gaps between high- and low-SES students widen over time if they do not attend school. The expansion of the achievement gap is less when high-SES children attend high-quality schools and low-SES children attend low-quality schools instead of staying at home. This is the situation encountered in the United States, for example. Schooling nonetheless equalizes performance, even though school quality differs for students from different socioeconomic backgrounds.

However, the findings from the literature on differentiation and segregation suggest that the equalizing effect of schooling may be higher if disadvantaged children attend high-quality schools (Figure 2.1). This can only be investigated to a limited extent in the United States where disadvantaged children predominantly attend low-quality schools. However, "one should not mistake the schools we have now for the schools we could have" (Gamoran, 2016, p. 231). Moreover, schools in the United States should not be mistaken for those in other countries.

Figure 2.1: The effects of attending no school, a low-quality school, and a high-quality school for students with different SES



2.5 Hypothesis

Integrating the literature on school segregation and tracking and on summer and school-year learning, I hypothesize that schooling effects vary between countries depending on the extent to which the spheres of family and school overlap. Schooling may have a stronger equalizing effect in countries where children with different socioeconomic backgrounds learn together in the same schools. In these countries with lower levels of inequality between schools, low-SES children attend schools of higher quality than they do in countries characterized by high levels of inequality between schools. In countries with high inequality levels between schools, by contrast, disadvantaged children face a stronger cumulative disadvantage within families and schools. Therefore, I hypothesize that the less differentiated or segregated a school system is, the greater the capacity of schools to compensate for a disadvantageous family environment.

However, there are two processes that could counteract the potential of high-quality schooling to compensate for a disadvantageous family environment. First, children's capacities to benefit from instruction could depend on their competencies at school entry. On average, high-SES children enter school better prepared than their low-SES peers. This could prevent schools from compensating for a disadvantageous family environment. Second, high-SES parents may especially try to boost their children's performance when their children perform poorly. Therefore, parents' behavior may counteract the potential of high-quality schools to compensate for a disadvantageous family background. In sum, in this thesis, I investigate whether integrated school systems are partly able to compensate for a disadvantageous family environment or whether this is prevented by high inequality levels between families, lower skills of low-SES children at school entry, or parents' behavior.

3. Left behind? Diverging SES-related trajectories in cognitive development

3.1 Abstract

In this chapter, I contribute to the debate on whether highly able children from socioeconomically disadvantaged families fall behind their more advantaged but less able peers in terms of their cognitive performance over the years of their schooling (Feinstein, 2003; Schoon, 2006), or whether this finding is merely a statistical artefact due to regression to the mean (Jerrim & Vignoles, 2013). My analysis covers children's cognitive development from the ages of 5 up to 14 years using data from the ECLS-K 1999 study. It reveals that even after accounting for regression to the mean, children from disadvantaged families who showed high achievement at the age of 5 were unable to maintain their high achievement levels to the same extent as their more privileged peers. By contrast, low-performing preschool children from advantaged families showed improvement compared with their initially similarly performing peers from disadvantaged homes.

3.2 Introduction and Research Question

Early childhood education is one of the key programs deployed by policymakers to tackle educational inequalities because of the large existing SES achievements gaps at school entry (Heckman, 2006; Waldfogel, 2004). However, there is an ongoing debate on whether children from disadvantaged families have limited opportunities to succeed in education even if they are well positioned at the start of their schooling. The findings of key studies reveal that highly able children from disadvantaged families fall behind their initially similarly performing peers from better-off families. At the same time, low-performing children from better-off families catch up over the course of their schooling. Among these studies, some find that in terms of cognitive skill development, highly able children from disadvantaged families are overtaken by their richer but less able peers (Blanden et al., 2012; Feinstein, 2003; Schoon, 2006). This finding suggests that early resilience against poor socioeconomic conditions does not remain stable over time and that socioeconomic background is actually more important for children's cognitive development than their early demonstrated ability. If true, this would mean that relying solely on early childhood interventions to tackle educational inequality may not be sustainable because cognitive gains from preschool education vanish over time.. The finding that highly able children from disadvantaged backgrounds are overtaken by their less able but richer peers has attracted public attention, as it highlights the lost potential of these children. The finding even speaks to those who hold that many low-SES children do not have the potential to do well in school, or to those who ascribe to the view that educational inequalities have genetic causes (Herrnstein & Murray, 1994). If low-SES children who perform well in early childhood do not succeed in school, this suggests that the limited opportunities available to them play a part. Children who performed

well in an earlier test have already demonstrated their ability to do well at school. These findings have prompted social justice concerns, and have been cited in the Poverty Review for the UK (Field, 2010), the British coalition government's Social Mobility Strategy (Cabinet Office, 2011), as well as by educational charity organizations (The Sutton Trust, 2008).

However, Jerrim and Vignoles (2013) have criticized the findings that initially high-performing but disadvantaged students fall behind their advantaged peers, while initially low-performing but advantaged students catch up, claiming that these are merely statistical artefacts due to regression to the mean. They argue that a disproportionate number of high-performing preschool children from disadvantaged families were just lucky guessers and did not actually perform well in the first test, whereas many low-performing preschool children from advantaged families who took the first test were simply having a bad day. While this critique does not question the claim that a strong relationship exists between socioeconomic status and children's outcomes, it does question whether children with similar performance levels at early ages develop differently depending on their family backgrounds. Thus, Jerrim and Vignoles (2013) do not question that high-SES children are already performing better in cognitive tests than low-SES children at early ages. However, they question whether high-performing children from disadvantaged families fall behind their peers, whereas low-performing children from better-off families catch up over time. This would be in line with the view of those who hold that many low-SES children do not have the abilities to do well in school or that educational inequalities have genetic causes (Herrnstein & Murray, 1994).

Importantly, I would like to emphasize here that I do not agree with the use of children's early test scores as an estimate of their "innate ability." By the time children take these early tests, lower-SES children may have already fallen behind their higher-SES peers. Hence, the degree to which children subsequently fall behind is only a lower bound estimate of the lost potential of disadvantaged students. This chapter explores the question of what happens throughout elementary and middle school over and above what has already happened before children enter school.

My analysis of data from the ECLS-K study conducted in the United States contributes insights to the discussion on whether low-SES but highly able children fall behind over the course of their schooling, while initially low-performing children from better-off families catch up. The ECLS-K study covers children's cognitive development from kindergarten up to grade 8, using the same scale to report their cognitive performance over time and providing several measurement points. These features of the study offer some key advantages over previous studies. Notably, they allow for controlling for regression-to-the-mean effects by averaging students' performance over several measurement points, or over different test domains, while retaining a sufficient number of measurement points for analyzing cognitive development.

I find that taking regression to the mean into account attenuates the results, but the same pattern remains, namely that high-performing preschool children from disadvantaged homes fall behind their initially similarly performing peers from advantaged families. Students who perform poorly in kindergarten catch up over the course of their schooling if the SES of their parents is high. A high SES partially compensates for initial low performance as these

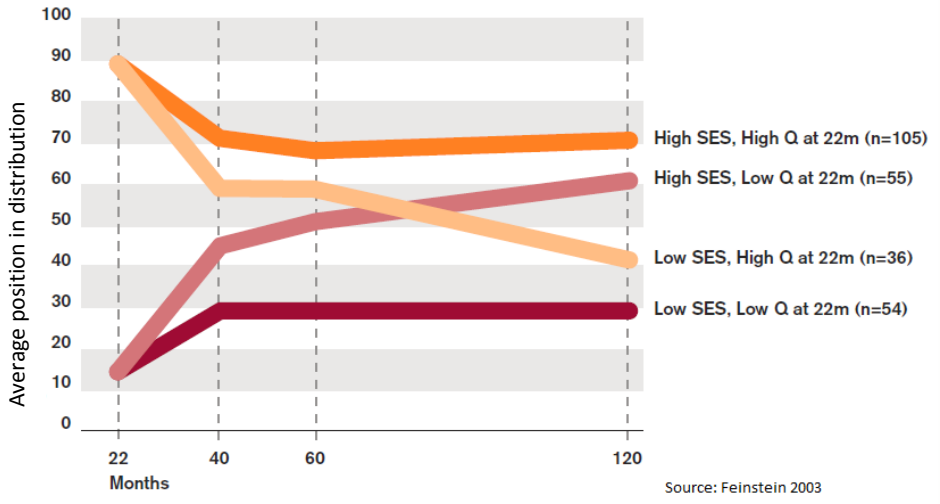
students catch up with respect to their peers, whereas students from lower backgrounds who perform poorly in kindergarten tend to remain low performers.

The chapter is organized as follows. It begins with a review of the literature outlining various theoretical perspectives. I next discuss a number of methodological challenges, including regression-to-the-mean effects, and the strategies to take regression to the mean into account. The subsequent core section of the chapter is devoted to the findings and their discussion.

3.3 Literature Review: Are low SES children left behind over the course of their schooling?

A graph presented in an article by Feinstein (2003) first sparked the debate on the falling behind of high-performing children during their schooling. Analyzing data from the 1970 British Birth Cohort Study, Feinstein found that children from low socioeconomic backgrounds whose test scores at an early age (2 years) were high performed less well when they were retested at a later age than children from higher socioeconomic backgrounds whose earlier test performances were similar. At the same time, Feinstein found that children from higher socioeconomic backgrounds, whose initial performance was poor, tended to catch up, whereas children from disadvantaged backgrounds whose initial performance was also poor were very unlikely to do so (Feinstein, 2003). Consequently, socioeconomically disadvantaged children who performed well at the age of 2 were overtaken before the age of 10 by more advantaged students whose initial performance was low (see Figure 3.1 sourced from Feinstein).

Figure 3.1: Average ranks of test scores at 22, 42, 60, and 120 months by SES of parents and early rank positions (Source: Feinstein 2003)



Different data sources, for different countries and for different ages reveal similar results. In her book titled *Risk and Resilience*, Schoon (2006) shows that early positive adjustment to

adverse socioeconomic conditions does not remain stable over time for most children. Based on her analysis of data from the 1958 National Child Development Study and the 1970 British Cohort Study, she finds that resilient children whose scores in an earlier test were above average, despite their socioeconomically less advantaged family backgrounds, seem to fall behind their peers as they get older. Comparing the influence of families on children's educational trajectories in the UK and Australia, Blanden et al. (2012) used more recent data from the British Millennium Cohort Study and the Longitudinal Study of Australian Children to carry out their study. Their findings are similar to those of Schoon and Feinstein (2003) for the British cohort, but are less so for the Australian cohort. In their book *Too Many Children Left Behind*, Bradbury et al. (2015a) come to similar conclusions as Feinstein and Schoon regarding children in the United States.

Though the primary focus of this literature is on the falling behind of high-performing students from disadvantaged families, it reveals a more general trend, namely the increasing influence of families' SES on children's test scores. If differences in test scores by SES increase for all students, it is not surprising to find that they also increase for high- and low-performing students. Notably, findings on whether family background becomes more or less important for children's school performance as they get older are more mixed. For the 1970 birth cohort in the UK, Feinstein (2003) finds increasing inequalities by socioeconomic background as children grow older and Heckman (2006) comes to similar conclusions for the United States. However, more recent data examined by Blanden et al. (2012) shows no increase in inequalities between children from varying socioeconomic backgrounds. What these authors do find, however, is that initially high-performing children from low-SES families fall behind as they get older.

Bukodi, Erikson, and Goldthorpe (2016) also compare the trajectories of children who demonstrated similar levels of cognitive ability in early life, but they focus on later educational attainment rather than on competence development. They show that "parental class, status and education, when taken together, create wide disparities in the eventual educational attainment of individuals who in early life were placed at similar levels of cognitive ability" (Bukodi et al., 2016, p. 294). To sum up, the literature presented here shows that the trajectories of children whose initial performance when entering school was similar diverge over the course of their schooling. However, the methodological critique offered by Jerrim and Vignoles (2013) questions these findings. These authors argue that low-SES children entering school well prepared are not at any disadvantage compared with high-SES children who enter school similarly prepared.

3.4 Theory

From a theoretical perspective, there are arguments to support both views: why low-SES children whose initial abilities are similar to those of their peers from better-off families might fall behind during their schooling, and why, on the other side, although children might enter school with different ability levels, existing gaps do not subsequently widen. In the next chapter, I empirically investigate the mechanisms that explain *why* children fall behind in

school. In this chapter I focus on the question of *whether* or not low-SES children fall behind their peers. Accordingly, I present some theoretical considerations that can shed light on the mechanisms underlying the findings.

3.4.1 The role of children's abilities

The skills with which children are already equipped at school entry lay the foundation for their future learning (Heckman, 2006). Thus, children entering school with advanced reading and counting abilities have an advantage over their peers with lower skill levels. The underlying theoretical premise is that learning begets learning (Cunha & Heckman, 2010; Heckman, 2006; Stanovich, 1986). This notion hinges on two mechanisms. First, if children master the tasks they encounter in school, then their motivation and interest will grow (Covington, 1992). Therefore, they will be more motivated to continue learning, whereas their peers who fail at the same tasks may be demotivated. Thus, higher skill sets at an early age could foster self-reinforcing motivation to learn. Second, children with higher cognitive, social, and emotional competencies can make better use of the learning opportunities they encounter at school (Heckman, 2006; Sørensen & Morgan, 2000). Reading skills, for example, are a resource for further learning (Stanovich, 1986). To sum up, children entering school with higher skill sets learn more than their peers entering school with lower skill sets.

The notion that learning begets learning is a component of the more general mechanism of cumulative advantage, which is based on the premise that current levels of accumulation of resources such as cognitive development, prestige, income, or wealth have direct causal effects on future levels of accumulation. Therefore, an initial advantage in having access to a particular resource grows over time (DiPrete & Eirich, 2006). If the level of resources at a given time causally conditions later outcomes this is known as a path-dependent process of cumulative disadvantage (Baumert et al., 2012; DiPrete & Eirich, 2006).

The process of path-dependent cumulative disadvantage is independent of the origins of early skill gaps. Whether the reason that children perform better than their peers is because they receive more support at home, possess certain genetic endowments, or are older than their classmates, possession of advanced skills at an early age is always an advantage for future learning. Initial differences in skills result in widening gaps over time. By contrast, children who perform similarly at an early age have the same abilities to use the learning opportunities they encounter in school.

How then does cumulative advantage due to the possession of advanced skills relate to SES achievement gaps? As high-SES children on average enter school with higher competencies (Waldfogel, 2004), they are better prepared to learn in school. Therefore, if learning begets learning, then SES achievement gaps will widen over time. The learning-begets-learning perspective thus explains widening SES achievement gaps exclusively in terms of children's differing abilities. However, children with similar cognitive competencies at an early age have the same capacities to use the learning opportunities they encounter at school, and they also experience the same processes of self-reinforcing motivation to learn. Therefore, the learning-

begets-learning perspective predicts similar cognitive development of children whose early performance is similar regardless of their SES. Thus, this study's first hypothesis is:

Hypothesis 1: The school trajectories of children with different SES do not diverge if they enter school with the same competencies.

3.4.2 The roles of families and schools

3.4.2.1 Families

The learning-begets-learning perspective focuses on children's own competencies, but it does not consider their differing environments and learning opportunities encountered in their everyday lives. It may well be the case that children with similar competencies are able to make the same use of learning opportunities that they encounter within their families and schools. However, fewer opportunities open up for low-SES children within their families and schools compared with those that open up for high-SES children. Children from low-SES families may fall behind their peers over the course of their schooling, because they are exposed daily to a family learning environment endowed with fewer economic, cultural, and social resources than that of their peers with high-SES parents (Bourdieu, 1983; Coleman, 1988). These circumstances give rise to a time-dependent process of cumulative advantage through cumulative exposure (Baumert et al., 2012). This means that high-SES children who are raised in a more stimulating learning environment enter school with better reading and counting skills than their low-SES peers. Moreover, they continue to learn more than their low-SES peers, because they receive more stimulation and better support at home. This leads to the second hypothesis as follows:

Hypothesis 2: Low-SES children will fall behind their peers from better-off families over the course of their schooling.

Low-SES parents may also be able to support their children with their reading and written homework in the early school years. However when their children advance further in their schooling and have to write essays or solve complicated mathematical problems, it becomes increasingly more difficult for low-SES parents to support their children in completing tasks that they themselves have not performed at school. This could explain why even initially high-performing children from low-SES families fall behind over the course of their schooling.

3.4.2.2 Selection

It is necessary to consider what has already occurred before children enter school. Children entering preschool who are well equipped with reading and counting skills are likely to have parents who are supportive regardless of their SES. Thus, high-performing children with low-SES parents are a positively selected group. The opposite is true for children, who despite having high-SES parents, perform poorly when entering school. There may be several reasons for the poor performance of these children such as their parents' lack of time to support them,

notwithstanding ample socioeconomic resources, parental divorce, or learning difficulties. Therefore, low-performing children with high-SES parents are a negatively selected group. This would support Hypothesis 1, which says that SES achievement gaps at school entry will not continue to widen. If, on the contrary, the positively selected group of high-performing children with low-SES parents still falls behind in comparison to other children from better-off families over time, this is a strong finding in support of Hypothesis 2, according to which SES achievement gaps widen after school entry. The same is true if high-SES children catch up with their peers over time even though they performed poorly at school entry. To sum up, a consideration of selection processes supports the expectation that high-performing children do not fall behind, regardless of their SES. Moreover, poorly performing children with high-SES parents are not expected to catch up over time, as they are a negatively selected group.

3.4.2.3 Family compensation in advantaged families?

By contrast, the mechanism of compensatory advantage predicts that family effects are strongest among low-performing students (Bernardi, 2011; Torche, 2016b). The underlying notion is that negative events or challenges have less impact on children from advantaged families that are better able to compensate for these negative events than on children from disadvantaged families. For example, parents from relatively high socioeconomic backgrounds will still try to send their children whose grades are poor to schools and tracks leading to university, whereas those from relatively lower socioeconomic backgrounds will be less likely to do so (Bernardi, 2011; Breen, 1997). Similarly, parents may try to support and stimulate a child whose early development is slow. Based on the assumption within social mobility research that families try to avoid downward social mobility for their children, better-off parents are more likely to respond to the low performance of their child. Thus, performance at school that is relatively low may be more alarming for families from more advantaged socioeconomic backgrounds, as they are more likely to fear downward social mobility. Educated parents also see an intrinsic value in education that makes the low performance of their children less acceptable to them. In addition, compared with low-SES families, high-SES families have more resources and more knowledge at hand, which allows them to provide additional support for their children. They may, for example, support their children with their homework, pay for private tutoring, or send their children to private schools. Thus, the mechanism of family compensation predicts that children performing poorly but coming from advantaged families catch up over time, leaving their initially similarly performing peers from disadvantaged families behind. Thus, a further hypothesis is:

Hypothesis 2b: Achievement gaps by socioeconomic background increase most among low-performing students.

3.4.2.4 Schools

Children's learning is shaped not only by families, but also by schools. Given high levels of socioeconomic and racial segregation between neighborhoods and schools in the United

States, children with high-SES parents do not attend the same schools as their low-SES peers. Schools in poor neighborhoods have fewer resources, because US schools are partly financed locally (Arroyo, 2008). They have difficulties attracting and retaining good teachers, and, consequently, they have fewer high-performing students. Thus, in addition to disadvantaged family environments, low-SES children attend schools of lower quality in the United States.

Therefore, even if a low-SES child is well prepared for school and well supported by his or her parents at home, he or she will still attend a school of poorer quality than the school attended by a high-SES child. Even if low-SES parents are ambitious, they find it more difficult to send their child to a good school, as school districts are locally defined. Therefore, in general, low-SES students will attend schools where the average skill level of students is lower than that of students in schools attended by high-SES children. Initially high-performing children with low-SES parents attend schools that have few other high-performing children and do not find their lessons challenging (Reardon, 2008). By contrast, high-performing children from high-SES families attend schools with other high-performing, high-SES students. The distribution of students across schools tends to enhance the learning of low-performing high-SES students but not the learning of high-performing low-SES students. This supports Hypothesis 2, which posits that low-SES children will be left behind during the course of their schooling.

3.4.2.5 Summary

To sum up, Hypothesis 1 states that children with similar competencies at school entry develop in similarly ways over the course of their schooling, regardless of their parents' SES, because these children have the same learning capacities. A consideration of selection processes further supports this view, namely that high-performing children from disadvantaged families are a positively selected group and are therefore unlikely to fall behind their peers from more advantaged families. Poorly performing children from advantaged families are negatively selected and are therefore unlikely to catch up over time. By contrast, Hypothesis 2 posits that low-SES children are left behind over the course of their schooling, as they are cumulatively exposed to fewer learning opportunities both within their families and schools. Whereas both hypotheses assume similar effects for all children, the mechanism of cumulative advantage leads to the expectation that SES effects are strongest among low-performing children (Hypothesis 2b).

3.5 Methodological challenges

In the above section, I have presented theoretical arguments to support each of these views, namely, why low-SES children are left behind over the course of their schooling, or, conversely, why children with similar competencies at the beginning of their schooling will develop in similar ways that are independent of their parents' SES. This raises an important question as to why it is not possible to engage in a straightforward examination of the data to

compare the cognitive development of students whose SES and early performance differ. The main methodological challenge in this regard is regression to the mean, as described below.

3.5.1 Regression to the mean and the socioeconomic structure of random errors

Jerrim and Vignoles (2013) argue that the falling behind of high-performing children from low socioeconomic backgrounds is simply a statistical artefact due to regression to the mean. They contend that the same explanation applies to low-performing children with high-SES parents catching up over time. In their opinion, many students from low socioeconomic backgrounds who performed well in the first test were not actually high performers but were having a good day or were lucky guessers. As their high performance was solely due to these random factors, their performance in the next test was lower. Thus, Jerrim and Vignoles argue that regression to the mean occurs as a socioeconomically structured phenomenon. I will first explain the phenomenon of regression to the mean before explaining how it could differ according to children's SES.

Regression to the mean occurs because tests scores have two components: a "true" ability and a random error component. The random error component could result from a temporary lapse in attention or distraction, or it could be attributed to "a good day," lucky guessing, or recent study of particular items. The group of students with high test scores includes more students with a disproportionately high positive random component than the group of students with low scores, which includes more students with a negative random component. Because this component is random, however, those with high random components in the first test will tend, on average, to have lower random components in the second test and vice versa (Treiman, 2009). That is, both the high and the low values move or "regress" toward the mean. This is true even when there is no change in the true value between the two measurements.

In terms of this study's research question, this means that students whose performances are high or low in the first test will move toward the mean in the second test, even if their true performance does not change. As long as the effect is the same for high- and low-SES students, regression to the mean does not explain why SES achievement gaps increase among initially similarly performing students over time. All high-performing and all low-performing students move toward the mean independently of their SES.

However, Jerrim and Vignoles (2013) claim that the effect of regression to the mean is not the same among children from different socioeconomic backgrounds. Instead, they argue that the effect is exacerbated for high-performing children of low-SES parents and for low-performing children of high-SES parents, because these students are "unusual." Students from low socioeconomic backgrounds who perform well against all odds are further away from their group mean than are high-performing students from high socioeconomic backgrounds. The error terms increase with an increasing distance from the group mean (Jerrim & Vignoles, 2013). Studies focusing on students from poor or less educated families who have managed to beat the odds by attaining success have largely examined small groups of students. For example, the group of initially high-performing students from low socioeconomic

backgrounds in Feinstein (2003) comprised just 36 students. The regression-to-the-mean effect is stronger for these few "unusual" students than for the larger group of high-performing high-SES students (Jerrim & Vignoles, 2013).

Put simply, Jerrim and Vignoles (2013) argue that many students from low socioeconomic backgrounds with high test scores were lucky guessers, or were just having a good day, and are not actually high performers. Conversely, many low-performing children from high socioeconomic backgrounds were having a bad day when they took the test. To sum up, statistical arguments lead to the expectation that controlling for regression to the mean, students from low socioeconomic backgrounds will not fall behind their peers whose initial test performance was similar. This expectation would be in line with Hypothesis 1 which predicts that children with similar initial performances will develop in similar ways independently of their socioeconomic background when controlling for regression to the mean.

However, further reflection on why the random component may not actually be random and may instead be socioeconomically structured from a substantive and not a statistical perspective elicits the opposite expectation. Children from low socioeconomic backgrounds will have many more "bad days" than children from high socioeconomic backgrounds. For example, their parents may have had a fight or they may not have had breakfast. Consequently, it is less likely that low-SES children will perform well just because they are having a good day. Instead, it is more likely that their random component biases test scores in a downward direction. This leads to the following expectation: when controlling for regression to the mean by reducing random error, the extent to which children from low socioeconomic backgrounds fall behind is not reduced. The school trajectories of children from different socioeconomic backgrounds diverge throughout their schooling depending on their socioeconomic backgrounds, even if they start school with similar abilities. This also holds when controlling for regression to the mean (Hypothesis 2).

3.5.2 Dealing with regression to the mean

There are several ways of dealing with regression to the mean. The underlying objective is always the same: to reduce the random component of the test scores. Therefore, I use a dataset with a large-sized sample for investigating children's development in reading. Feinstein (2003), for example, only had a total of 36 students in his group of high-performing students from low socioeconomic backgrounds. By contrast, the ECLS-K data that I analyzed covered 612 students in this group.

One way of reducing measurement errors to account for regression to the mean is to use the average score of several tests to decide whether a child belongs to the group of high-performing or of low-performing children. These tests can either be from several waves or for different domains. Consequently, the use of more tests leads to the averaging out of the variance of error terms. Jerrim and Vignoles (2013) applied this strategy in relation to the "Avon Longitudinal Study of Parents and Children" (ALSPAC) in the Bristol area, Britain, using additional tests to define high- and low-performing children. Thus, they were able to

reduce measurement errors to adjust for regression to the mean. Applying this strategy they "no longer find any evidence that the cognitive ability of bright children from poor homes suffers a striking decline" (Jerrim & Vignoles, 2013, p. 905). This finding clearly challenges the claim that high-performing children from socioeconomically disadvantaged families fall behind.

However, after adjusting for regression to the mean, a conservative measure of the extent to which initially high-performing students from low socioeconomic backgrounds fall behind is obtained. This is because students now have to perform well on different tests or over a longer period of time to be counted as high-performers. This is also reflected in the simulation model developed by Jerrim and Vignoles (2013), which shows that after accounting for regression to the mean, the true rate at which initially high-performing children from low socioeconomic backgrounds fall behind has been underestimated.

Feinstein (2003), Schoon (2006) and Blanden et al. (2012) did not control for regression to the mean. However, their results show that low-SES children continue to fall behind after the second measure. As the error term is a random component, the regression-to-the-mean effect occurs exclusively between the first and second tests if errors are uncorrelated. Therefore, "the continuing decline in scores after wave 2 for low-SES children with high initial scores and the improvement in scores for high-SES children with low initial scores may have some foundation" (Blanden et al., 2012, p. 157). Bradbury, Corak, Waldfogel, and Washbrook (2015b) adjusted for regression to the mean using test scores at the first measurement point as an instrumental variable to predict test scores at the second measurement point. As the title of their article indicates, they still found that "too many children are left behind".

Here, I aim to contribute further to this ongoing debate through an examination of data from the ECLS-K study conducted in 1999. This study demonstrates several advantages over those used by Jerrim and Vignoles (2013), Schoon (2006), and Blanden et al. (2012). It includes many more measurement points, and it measures competencies in a sophisticated way that reduces the scope for measurement error. It also uses the same scale over time to report competencies. Below, I explain why these aspects are important when controlling for regression to the mean.

3.5.2.1 Same scale

Regression to the mean is not only due to measurement errors, but it also results from changes in the content and scale of the tests being applied (Lohman, 2006). A problem encountered by researchers whose aim is to assess cognitive development over an individual's life course, beginning from an early age, is that the same tests are not applicable at ages that are far apart. Feinstein (2003), for example, used a test based on a combination of cognitive, personal, and locomotive skills of children aged 2 years, whereas his measure applied for children aged 10 years was based mainly on reading, mathematics, and language assessments. This can be problematic if locomotive skills are less influenced by socioeconomic background than are language skills. If this is true, more children from lower socioeconomic backgrounds will perform better in the locomotive test applied at early ages than they will in the mathematics

and language assessments conducted at later ages. In this case, children from low socioeconomic backgrounds would seem to fall behind, even though this is not actually the case. This finding is misleading, as the competencies tested at later ages do, in fact, depend more on socioeconomic background. Regression to the mean due to changes in the content of the tests can thus be taken into account only when the same metric is used in the administered tests.

The measures used in the ECLS-K study on children aged 5 to 14 years are reported on the same scale. However, the downside is that the data set only begins with measurements conducted on children aged 5 years, whereas measures for the 1970 birth cohort study were applied to children aged 2 years. This is why my estimates are more conservative than those of Feinstein (2003), for example, who shows that highly able children from low socioeconomic backgrounds start falling behind at an age that precedes my first measurement point.

Within the literature, skills are not measured on the same scale over time. Consequently, percentile ranks are used to make skill measures comparable over time. A high rank for a particular subgroup indicates that this group performs well in comparison to other groups. The use of rank positions indicates that education is conceptualized as a positional good. When competing for jobs, those candidates with better skill sets than others are more effective. Nevertheless, skills per se are also helpful. From a methodological perspective, the disadvantage of percentiles is that they lead to ceiling and floor effects, because students at the lower end cannot lose, and those at the higher ends cannot gain (Lindahl, 2001). Therefore, I used t-scores instead of percentiles.

3.5.2.2 "Guessability"

The more accurately children's reading and mathematics competencies are measured, the less the occurrence of regression to the mean. Competence measures in the ECLS-K study are based on many items, leading to a reduction in the measurement error. Questions that are easy to guess are down-weighted. In addition, the overall pattern of correct and incorrect responses is assessed. For example, if a student answers all of the simple items in a test incorrectly, but answers one very difficult question correctly, then he or she will still be considered a low-performing student (Rock & Pollack, 2002, pp. 42-45). Consequently, high scores based on random guessing are unlikely, as these are accounted for in the scaling.

3.5.2.3 Ceiling and floor effects

To enable the influence of families' SES over time to be compared, tests should not only measure differences that revolve around the average, but they should also differentiate between high- and low-performing children. If, for example, the first test is still so difficult that no child is able to answer a single question, families' SES evidently has no effect at the first measurement point. When children are older, the level of difficulty of the test becomes more appropriate, meaning that SES differences become visible. In this scenario, it would be

wrong to conclude that the importance of SES increases over time. To reduce ceiling and floor effects, a two-stage design was implemented in the ECLS-K study (Rock and Pollack 2002, p. 56). Students first took a brief "routing test" containing a wide range of items encompassing different levels of difficulty. The results were used to select the primary test containing questions entailing an "appropriate" level of difficulty (Rock & Pollack, 2002). In this way, ceiling and floor effects were reduced, as only very few children were able to answer all or no questions.

3.5.2.4 More measurement points

The ECLS-K study provides measures of mathematics and reading skills at seven points in time. This provides for at least two measures to adjust for regression-to-the-mean effects.

To sum up, the ECLS-K data are appropriate for accounting for regression-to-the-mean effects, as test results are reported on the same scale over time. A two-stage design, where students are assigned tests with different levels of difficulty, depending on their results in a routing test, reduces the scope for measurement error at the top and bottom of the distribution. Finally, there are enough waves to enable the measurement of cognitive development, even when controlling for regression to the mean.

3.6 Data

As previously mentioned, the data used in this study has been extracted from the ECLS-K, a nationally representative survey conducted in the United States. Children were followed from kindergarten through middle school until grade 8.

3.6.1 Dependent Variables: Reading and Mathematics Scores

Children's language and literacy skills were simultaneously tested with their mathematical thinking skills in the fall and spring terms of kindergarten (1998–1999), the fall and spring of grade 1 (1999–2000), the spring of grade 3 (2002), the spring of grade 5 (2004), and the spring of grade 8 (2007). The tests conducted in the fall of first grade were administered only to 30% of randomly sampled schools.

The same instruments were used for the four assessment rounds conducted in kindergarten and grade 1. For the waves in grades 3, 5, and 8, new assessment instruments were developed to measure age-appropriate skills. To construct a common scale for all of the waves, some assessment items were reused across waves. In this way, achievement levels across grades could be compared and gains made by children from year to year could be quantified (NCES, 2002).

As my study focuses on gaps, I applied a mean of 50 in t-scores and a standard deviation of 10 for the first measurement point. I defined students as initially high-performing if they belonged to the upper tercile and as initially low-performing if they belonged to the lower

tercile of the performance distribution at the first measurement point. At this measurement point, the children were around 5 years old.

3.6.2 Socioeconomic Status

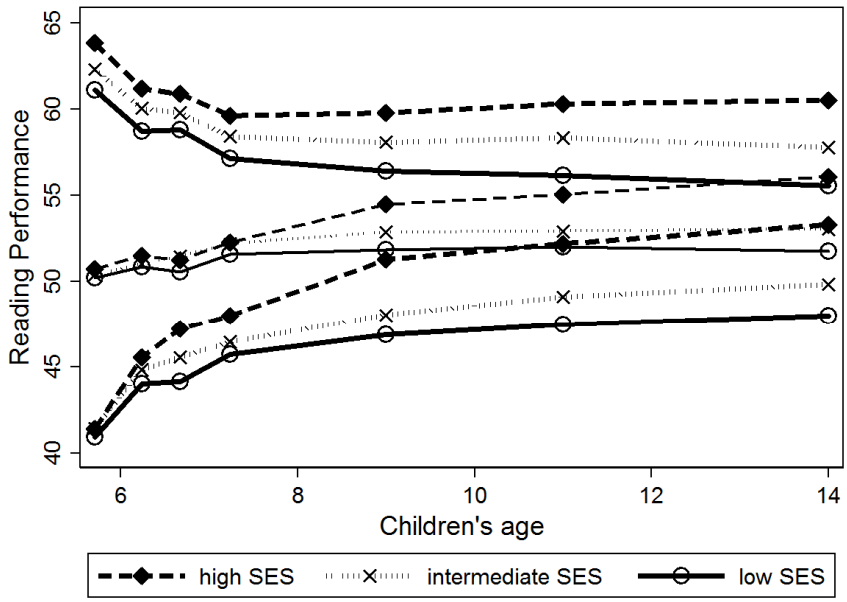
The SES measure comprised three components representing family income, parents' highest occupational status, and their highest educational level. I averaged the two SES measures in kindergarten and grade 1, thus halving the measurement error and reducing the likelihood of missing values. As a robustness check I also used parent's education. The results, shown in Figure A3.2 in the appendix, were very similar to those using parents' SES. To create SES terciles, I weighted the data using the recommended weight to account for sampling design and differential non-response.

3.7 Diverging trajectories in cognitive development

3.7.1 Growing gaps by SES

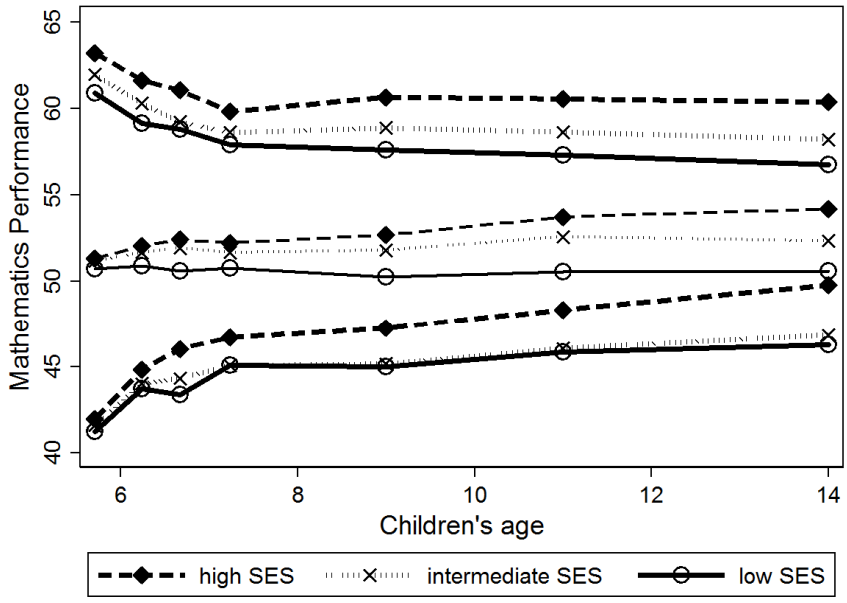
The central research question in my study is: How do preschool children with similar initial test performances but different socioeconomic backgrounds develop up to the end of middle school? Figures 3.2 and 3.3 show that among high-, intermediate-, and low-performing children, SES achievement gaps widen over time. Even two children who started school with similar levels of reading achievement will end middle school with a gap in reading competencies of about half a standard deviation if one child comes from a high-SES family and the other comes from a low-SES family. This is true for high-, average, and low-performing children alike. The findings thus support Hypothesis 1 that the trajectories of children from different family backgrounds relating to their cognitive development diverge over the course of their schooling. This is true even if they start school with the same level of reading or mathematics skills and thus have similar competencies to avail of the learning opportunities they encounter at school.

Figure 3.2: Reading development by parents' SES and early performance



Source: ECLS-K 1999

Figure 3.3: Mathematics development by parents' SES and early performance



Source: ECLS-K 1999

3.7.2 Very similar regression to the mean results among students with varying SES

Do these results hold even when controlling for regression to the mean? Regression to the mean is clearly evident in Figures 3.2/3.3. Both high- and low-performing children move closer toward the average after the first wave. However, contrary to the claim made by Jerrim and Vignoles (2013), this process does not vary for children from different socioeconomic backgrounds. From the first to the second measurement point, high-performing children from

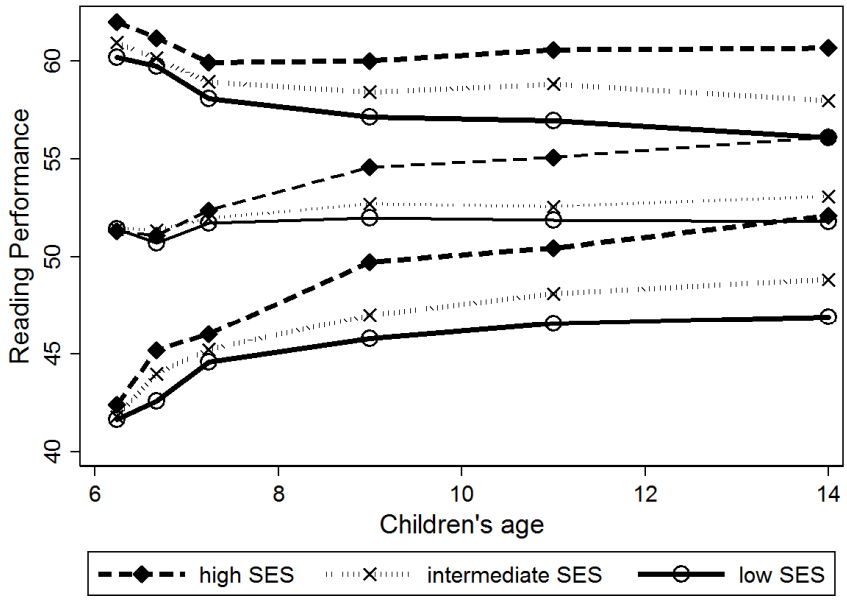
all family backgrounds move around 3 points closer to the mean. Thus, there is no differential regression to the mean according to socioeconomic background. This is true even though high-performing children from disadvantaged family backgrounds are an unusual group and there are, therefore, fewer children present in this group. In the group of low-performing children there is a slight tendency for greater movement of high-SES children toward the mean compared with low-SES children. This would be consonant with the notion of differential regression to the mean proposed by Jerrim and Vignole. To control for this, I accounted for regression to the mean.

3.7.3 Taking into account regression to the mean

To account for regression to the mean, I pursued three strategies. The first was to analyze cognitive development from the second wave onward. Figures 3.2 and 3.3 reveal that children from low-SES families continuously fall behind. As regression to the mean occurs due to a random error that is not correlated with subsequent random errors, the effects of continued diverging trajectories depicted in Figures 3.2 and 3.3 cannot be attributed to regression to the mean.

A second strategy that I applied to account for regression to the mean was averaging reading scores over the first two waves, as shown in Figure 3.4. A third strategy is to average reading and mathematics assessments conducted during the same wave (Figure A3.1). All methods reduce the random error, attenuating regression to the mean. At the same time, these methods underestimate the falling behind of students from socioeconomically disadvantaged families, because they require students to perform well at *two* measurement points or in reading *and* mathematics. Thus, the following estimates can be seen as lower bound estimates of the extent to which low-SES children are left behind.

Figure 3.4: Reading development by parents' SES accounting for regression to the mean



Source: ECLS-K 1999

3.7.4 Falling behind even after accounting for regression to the mean

The use of all three of the above described methods to account for regression to the mean confirmed the finding that children from disadvantaged family backgrounds fall behind their peers from better-off families in primary and middle school. Thus, children who are behind their peers in reading and mathematics at school entry will remain behind, only if they come from low-SES families. Children from better-off families, by contrast, catch up over time. This finding confirms the relevance of the concept of compensatory advantage (Hypothesis 2b), according to which better-off families attempt to compensate for the poor performance of their children. However, throughout the competence distribution initially similarly performing children grow apart if they come from different socioeconomic backgrounds. Therefore, Hypothesis 2b, which states that this process is strongest among low-performing children can be rejected.[2] Instead, the findings support Hypothesis 2, which states that children from socioeconomically disadvantaged families are left behind their peers from better-off families.

Turning to the question of the size of the effects, the findings show that children aged 5 years, who are initially positioned in the bottom tercile for reading skills, and who have high-SES parents, catch up to the extent that they even surpass children who started with intermediate skills at the same age. By contrast, initially high-performing children from disadvantaged family backgrounds fall behind their peers who started with similar skills, reaching a skill level equivalent to that of children from better-off families who started school with intermediate skills.

The findings show that children's relative performances in mathematics are more stable over time than their relative performances in reading. The extent to which initially high-performing students from low socioeconomic backgrounds fall behind their peers from more advantaged backgrounds is lower in mathematics than in reading. No group surpasses the other. Thus, family background seems to be more decisive for the development of reading literacy, whereas early performance independent of socioeconomic background is more decisive for performance in mathematics. Nevertheless, students performing at similar levels at the beginning of school develop differently in relation to mathematics, too, according to their socioeconomic backgrounds.

Developing a mobility table constitutes another method of assessing the extent to which children from low-SES families fall behind their peers from higher-SES families. I controlled for regression to the mean by averaging children's test scores in the fall and spring of their final preschool year, and by averaging their test scores in grades 5 and 8, as shown in Table 3.1. Thus, random errors were accounted for not only at the first measurement point but also at the last measurement point. Among high-SES children, 81% of the children scoring in the top performance tercile in preschool still obtain high scores in middle school. Among low-SES children, 58% of the children with high scores in preschool still obtain high scores in middle school.

[2] This holds under the assumption that the extent of gains at the bottom of the achievement distribution can be compared with the extent of gains at the top of the achievement distribution.

It is notable that only a few high-SES children perform poorly in preschool. This group is much smaller than the group of low-SES children who perform well. Even though the group of poorly performing high-SES children is the most selected group, the results indicate that these children catch up over time. Among the children performing poorly in kindergarten, the probability of those with high SES still scoring poorly in middle school is just 22%, whereas this probability is more than two-fold (51%) for low-SES children in middle school.

Table 3.1: Children's reading performance in preschool and in middle school depending on parents' SES

Performance in kindergarten (average of first two waves) and SES	Reading performance tercile in middle school (average of grades 5 and 8)			
	1st tercile	2nd tercile	3rd tercile	total
Low SES, low performance	233 51%	169 37%	55 12%	457 100%
High SES, low performance	50 22%	112 49%	67 29%	229 100%
Low SES, high performance	39 6%	222 36%	351 58%	612 100%
High SES, high performance	25 2%	206 17%	970 81%	1,201 100%
total	347 14%	709 28%	1438 58%	2494 100%

3.8 Conclusion and Discussion

3.8.1 Left behind

Children from socioeconomically disadvantaged families fall behind their peers from better-off families over the course of their schooling. Even when children start schooling with similar skill sets in reading and counting, their trajectories relating to cognitive development diverge depending on their parents' SES. This means that even low-SES children who perform well in kindergarten against the odds fall behind their initially similarly performing peers from better-off families. The probability of children with high scores in preschool continuing to obtain high scores in middle school is 81% if they come from high-SES families. However, there is a marked decline in this probability, which falls to 58% if they come from low-SES families. At the same time, low-performing children from high-SES families catch up over time. Thus, the adage "no child is left behind" does not hold true. Instead, "no high-SES child is left behind" comes closer to the reality.

3.8.2 Regression to the mean

The findings hold true even when controlling for regression to the mean. Though they indicate the occurrence of regression to the mean, this showed little or no variation among students from different socioeconomic backgrounds. Thus, when investigating high- or low-performing students, regression to the mean should be taken into account. However, if the focus of the investigation is on SES achievement gaps between high- and low-performing children and explaining how they develop, regression to the mean is less of a problem. This finding goes against the claims made by Jerrim and Vignoles (2013). This raises the question of why regression to the mean differs much less in relation to socioeconomic background in the analysis of the ECLS-K data than it does in the data analyzed by Jerrim and Vignoles. The ECLS-K study assessed reading and mathematics competencies on the same scale over time. In the literature, by contrast, cognitive development is often measured using different skills over time. In addition, a two-stage test design reduces measurement errors at the higher and lower ends of the performance distribution. The more appropriate data obtained in the ECLS-K study also explains why low-SES children fall less behind than in the analysis in Feinstein (2003) or Schoon (2006).

Feinstein (2003)'s methodology of comparing students with similar initial performances but from various socioeconomic backgrounds is pertinent, as he does not treat students with similar socioeconomic backgrounds as a homogeneous group. This perspective takes account of the fact that skills vary not only between socioeconomic groups but also within socioeconomic groups and over the individual's life course. Based on an examination of children whose initial performances were similar, the findings show that how children with similar early test scores develop in school differs by socioeconomic background.

3.8.3 Remarkable finding because of selection works in the reverse direction

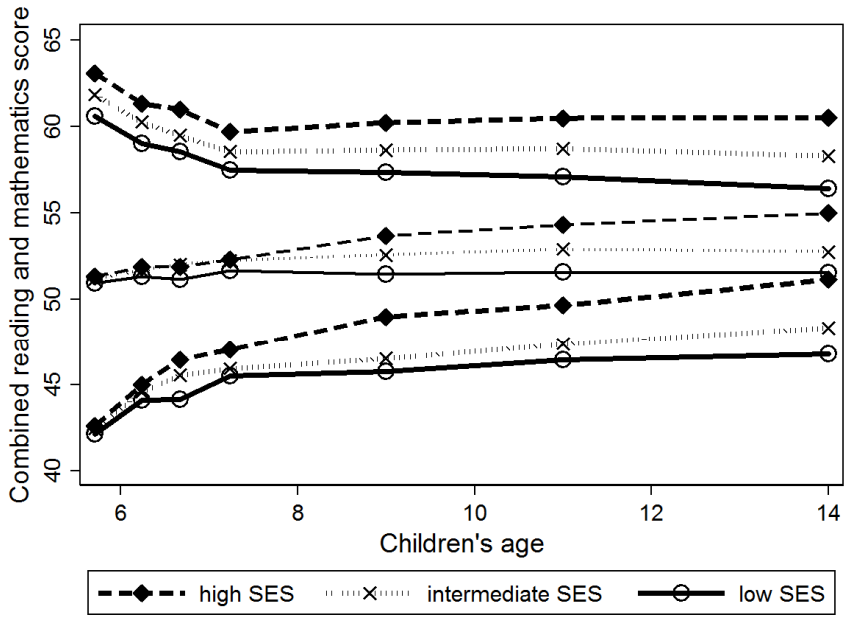
Differing from Feinstein (2003) and Schoon (2006), I do not find that initially high-performing but low-SES students are later outperformed by their initially low-performing but high-SES peers. However, the finding that initially similar performing low-SES children fall behind their high-SES peers raises concern, especially as selection works in the reverse direction. Students performing well despite their socioeconomic backgrounds do not lack either cognitive abilities or support from their families. Nevertheless, they fall behind their more advantaged peers whose initial test performances were similar, but who have richer or more educated families. The same holds true for low-performing children. If children perform poorly despite the ample social and economic resources of their families, this could be because they lack cognitive abilities or because their parents may not spend time with them. Nevertheless, even these negatively selected children catch up over time.

3.8.4 Implications of the findings

The findings are of concern, because they show that children from low socioeconomic backgrounds are not only less likely to perform well before school entry, but that they also fall behind over the course of their schooling. This implies that it is not enough to invest in early childhood education because starting school from the same point in terms of ability is not enough. Even high-performing children from low-SES families are likely to fall behind their peers from better-off families over time. Thus, the findings suggest that even if low-SES children have the same abilities to make use of learning opportunities at school as high-SES children do, they still fall behind the latter. This is because their learning environments within their families and schools are comparatively disadvantaged. In the next chapter, I examine more closely whether low-SES children who perform similarly to their high-SES peers are left behind because they are exposed to a less favorable family environment or because their school environment is less favorable. To conclude, while regression to the mean does need to be taken into account, beyond this, differential cognitive development according to children's SES does in fact occur and requires an explanation.

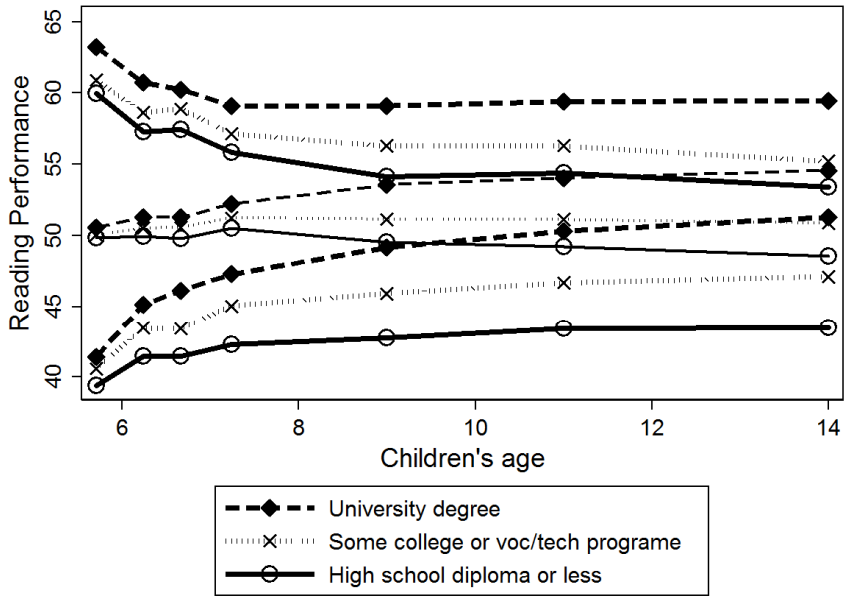
3.9 Appendix

Figure A3.1: Averaging reading and mathematics scores by parents' SES



Source: ECLS-K 1999

Figure A3.2: Reading development by parents' education and children's early performance



Source: ECLS-K 1999

Robustness checks: Using parents' education instead of their SES yields to similar results.

Table A3.1: Reading performance terciles in grade 8 by parents' SES and performance in kindergarten

Performance in kindergarten and SES	Reading performance tercile in grade 8			
	1st tercile	2nd tercile	3rd tercile	total
Low SES, low performance	145 41%	135 39%	70 20%	350 100%
High SES, low performance	28 15%	90 48%	68 37%	186 100%
Low SES, high performance	59 12%	163 34%	259 54%	481 100%
High SES, high performance	35 4%	187 19%	751 77%	973 100%
total	267 13%	575 29%	1148 58%	1990 100%

4. Why are low-SES children left behind? The roles of families and schools

4.1 Abstract

Why do children from socioeconomically disadvantaged families fall behind their peers from better-off families during their early years of schooling in the United States? Do they fall behind because they receive less support at home or because they attend worse schools than their more advantaged peers? I conducted a study in which I compared only children whose initial performances were similar to rule out the possibility that emerging gaps between children from different socioeconomic backgrounds reflect learning-begetting-learning effects. To separate the effects of families and schooling, I compared learning during the summer holidays to learning during the school year. During the summer holidays, schools are closed and learning is shaped only by non-school factors, mainly families. During the school year, learning is shaped by both families and schools. Using data from the ECLS-K 2011 study, SES achievement gaps among children whose initial performances were similar were found to widen during the school year and not during the summer holidays. This finding indicates that SES achievement gaps widen because of inequalities between schools and not because of inequalities between families. However, the school-based explanation cannot explain why SES achievement gaps mainly widen among low-performing children. Examining families' education-related behavior, I found that parents whose children performed poorly at school attempted to compensate for this by providing their children with extra support. High-SES parents have more resources at hand and appear to be more successful at providing their children with support.

4.2 Introduction and research question

Why are so many children from socioeconomically disadvantaged families left behind their peers from better-off families over the course of their early schooling? Do they fall behind because they receive less support at home or because they attend worse schools than their advantaged peers? Do the mechanisms vary among high- and low-performing children?

The findings in Chapter 3 confirmed that children from socioeconomically disadvantaged families fall behind their peers from better-off families over the course of their schooling. Thus, the adage that "no child is left behind" or that "every student succeeds," as the names of the last two major US education acts suggest, do not hold in reality. Instead, even when children begin their schooling equipped with similar skills in reading and counting, their trajectories in relation to their cognitive development diverge depending on their parents' SES.

From a policy perspective, it is necessary to determine whether these children are left behind because they attend worse schools than their peers from better-off families. If this is the case, then school reforms aimed at improving disadvantaged schools or granting low-SES children access to good schools would improve their educational opportunities. If, however, low-SES children fall behind their peers because they are exposed to more disadvantaged learning environments within their families, then education reforms are not targeting the real problem. In this case, a policy that addresses socioeconomic inequalities between families would be more effective in combatting educational inequality (Berliner, 2013; Blossfeld et al., 2016; Boyd-Zaharias & Pate-Bain, 2008; Coleman et al., 1966; Merry, 2013; Solga, 2012, 2014).

Methodologically, this question is challenging, because students from socioeconomically advantaged families not only tend to be raised within more stimulating and supportive home environments, but they also attend schools of higher quality than their peers from more disadvantaged families. Therefore, it is difficult to ascertain to what extent SES achievement gaps are caused by families or by schools.

In this chapter, I attempt to separate the effects of families and schools by comparing how much children learn during the long summer holidays and how much they learn during the school year. During the summer holidays, schools are closed and learning is shaped solely by non-school influences (Alexander et al., 2007; Downey et al., 2004; von Hippel, 2009). During the school year, children's development continues to be influenced by families, but the effect of schooling is also present.

To compare summer learning and school-year learning, I used data from the Early Childhood Longitudinal Study starting to follow kindergarten children in 2011 (ECLS-K 2011). The advantages of analyzing data from this study are that family and schooling effects can be separated, because achievement was assessed at the beginning and at the end of the final preschool year and grades 1 and 2[3]. However, the study did not include measurements taken at the beginning and end of the school year for subsequent years. Therefore, my analysis is limited to the early school years. This time scale contrasts with that applied in chapter 3, in which I presented an overview of students' cognitive development from preschool until the end of middle school.

Analyzing data from the new ECLS-K 2011 study from the United States, I find that the achievement gap between students from socioeconomically disadvantaged families and those from better-off families increased during the summer holidays, whereas it remained constant during the school year. This finding suggests that SES achievement gaps are mainly caused by unequal family conditions, whereas schools equalize performance. Without the influence of schools, gaps would widen even further. These findings are in line with the findings of earlier studies that focused on older cohorts (Alexander et al., 2001; Downey et al., 2004).

However, when comparing students with different SES but whose initial performance was similar, I found that the increase in SES achievement gaps during the school year was greater than it was during the summer, especially among low-performing students. This result is surprising, because low-performing children from high-SES families are an unusual group;

[3] The data covering grade 2 was not publicly available yet when I wrote this chapter.

they perform poorly even though their parents have a high SES. Therefore, the finding that this group catches up is unexpected.

What then are the mechanisms behind this pattern? The school-based explanation suggests that socioeconomically advantaged students attend better schools, because regardless of their performance, they live in richer neighborhoods. By contrast, socioeconomically disadvantaged students may only have the opportunity to attend good schools if they have ambitious parents and are especially bright. The alternative, family-based explanation draws on the concept of compensatory advantage (Bernardi, 2014; Torche, 2016b), positing that high-SES parents respond when their children perform poorly in grade 1 and consequently help their children with homework or invest in private tutoring.

This chapter is structured as follows. I first outline and bring together different strands of the literature. Next, I explain the methodological strategy used to separate the effects of family and schooling. After introducing the data, I present and discuss the findings.

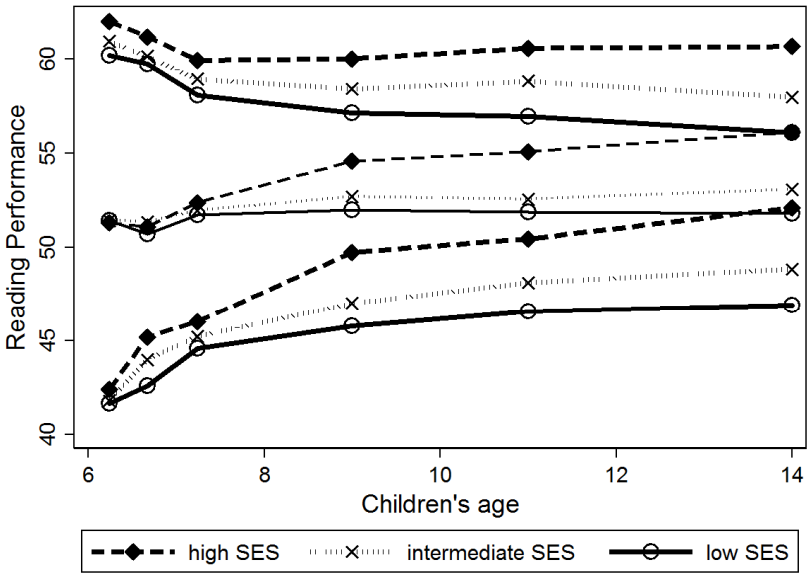
4.3 Debates within the literature

In this chapter, I draw together three strands of literature. The first strand focuses on the cognitive development of children with different SES but similar abilities. The second examines summer learning loss and the effect of families and schooling, and the third focuses on compensatory advantage.

4.3.1 "Too many children left behind"

The first strand of the literature investigates how children with similar initial performances but different SES develop (Blanden et al., 2012; Bradbury et al., 2015a; Feinstein, 2003; Schoon, 2006). In the preceding chapter, I showed that students from socioeconomically disadvantaged families fall behind their peers, whose initial performance was similar, over the course of their schooling from the ages of 5 to 14 years. In their book titled *Too many children left behind*, Bradbury et al. (2015a) come to the same conclusion. Figure 4.1 graphically shows how low-SES children are left behind over the course of their schooling. Gaps between high-SES children (dashed lines) and low-SES children (continuous lines) widen over the years in primary and middle school, even if children's performance levels were initially similar. This is true regardless of whether children enter school well prepared, with average reading and writing skills, or lagging behind their peers.

Figure 4.1: Reading development according to parents' SES



Source: ECLS-K 1999

This strand of literature stems from a debate initiated by Feinstein, who argued that highly able children from socioeconomically disadvantaged families fall behind their more advantaged but less able peers in terms of their cognitive performance (Blanden et al., 2012; Feinstein, 2003; Schoon, 2006). A key finding of this literature is that in late childhood, initially high-performing children from low-SES families are overtaken by their initially low-performing peers from better-off families. This finding implies that early resilience to poor socioeconomic conditions does not remain stable over time, and socioeconomic background has a greater influence on cognitive development than early ability does. It challenges the views that many low-SES children do not have the potential to do well in school and that educational inequalities have genetic causes (Herrnstein & Murray, 1994).

However, the finding that low-SES children fall behind in terms of test scores has been refuted based on the argument that it is a statistical artefact due to regression to the mean (Jerrim & Vignoles, 2011). Subsequently, the debate has focused on *whether* low-SES children, whose abilities are similar to those of their advantaged peers, are left behind. In Chapter 3, I demonstrated that despite controlling for regression to the mean, low-SES children still fall behind their more advantaged peers. However, the question remains as to *why* many low-SES children fall behind. Do they fall behind because they receive less support at home or because they attend worse schools than their advantaged peers? I address this critical question in this chapter.

4.3.2 Why are so many children left behind? The roles of families and schools

The second strand of the literature related to my study focuses analytically on the role of families and schools in creating educational inequalities. Specifically, studies within this strand compare summer learning and learning during the school year to separate the effects of

families and schools. I contribute to this literature by comparing children with different SES but whose skill levels are similar at school entry. Because the children in my study did not differ in terms of early skills, they were on a level playing field to engage with what they learned in school. I first introduce the debate on families and school before returning to these arguments in more detail.

The debate on the roles of schools and families in the creation of educational inequalities was prompted by the famous "Coleman Report" (Coleman et al., 1966). Long before the first PISA studies were conducted, Coleman and his team examined equality of educational opportunity based on an assessment of students' achievement in the United States. They found that students' achievement was most strongly related to their family learning environment. Thus, they concluded that the key explanation for inequalities in students' achievement lies in inequalities between families. Besides the family, the student body composition of a school and its teachers play a role. The non-social aspects of schools such as financial resources were not found to have an influence (Coleman et al., 1966).

4.3.2.1 Families as differential learning and developing environments

The above findings point to families as being the main source of educational inequalities. Families differ in their endowments of cultural, social, and economic resources (Bourdieu, 1983, Coleman, 1988). They therefore offer different degrees of cognitive stimulation and emotional support for children's development. This explains why children are already equipped with varying levels of language and mathematics skills at the onset of their schooling. Because children continue to be exposed to unequal family environments, cognitive inequalities can be expected to increase over time. To state this argument more formally, children face cumulative disadvantage resulting from a time-dependent accumulation process that interacts with socioeconomic status (Baumert et al., 2012). DiPrete and Eirich (2006) refer to this as "simple cumulative disadvantage." This leads to the first Hypothesis on family effects.

Hypothesis 1 on family effects: children from socioeconomically disadvantaged families continuously fall behind their more advantaged peers, because they are cumulatively exposed to a disadvantaged learning environment within their families (and neighborhoods).

4.3.2 Selection

At the same time, the process of cumulative exposure necessitates a consideration of the selection of high- and low-SES students into the groups of high- and low-performing students. From birth onwards, children are exposed to different family environments. Consequently, at about the age of 5 years, which marks the beginning of the observation period for the analysis presented in this study, children have already been exposed to their family learning environment for a period of 5 years. Therefore, children performing well at this age are likely to live in a favorable family learning environment, regardless of whether or not their families are well endowed with socioeconomic resources. Similarly, children who perform poorly despite coming from advantaged socioeconomic backgrounds are likely to grow up in less favorable family environments. For example, their parents may not spend a lot of time with

them. Thus, there is a lot of variability within different socioeconomic groups. Not all families that are endowed with more socioeconomic resources actually use them to support their children. Even within the group of socioeconomically advantaged families, those who spend more time in education-related activities such as reading together with their children, have higher performing children. Moreover, socioeconomically disadvantaged parents can support their children by engaging in education-related activities with their children. Considering these processes leads to the second hypothesis on family effects and selection as follows:

Hypothesis 2 on family effects and selection: High-performing children from low-SES families are strongly supported by their families and do not therefore fall behind because of a disadvantaged family environment. Low-performing children from high-SES families might not be adequately supported by their families.

4.3.3 Schools as differential learning and developing environments

Schools can be especially important resources for students from disadvantaged families, as they may compensate for low levels of stimulation and support received within families. However, in the United States, there is a high level of residential segregation, and schools are partly financed at the local level. Therefore, students with different socioeconomic backgrounds tend to attend different schools. This means that in addition to their differing experiences of family conditions at home, they also have different learning opportunities at school. This leads to the third hypothesis on school effects.

Hypotheses 3 on school effects: Schools in the United States cause a widening of SES achievement gaps between students.

The following question arises. Are there reasons to believe that school effect varies among high- and low-performing students? Because of the segregated nature of the US school system, high-performing, low-SES children attend schools with other low-SES children. As low-SES children perform worse on average than high-SES children, there will only be a few high-performing children in these schools (Reardon, 2008). Therefore, lessons are less challenging for such students. This leads to the following sub-hypothesis on school effects.

Hypothesis 3a: High-performing children from low-SES families are most disadvantaged by school conditions.

A second sub-hypothesis on school effects is as follows:

Hypothesis 3b: Low-performing children from high-SES backgrounds benefit the most from school conditions, as they attend good schools in good neighborhoods, regardless of their performance.

To sum up, the argument on school effects states that schools in the United States reinforce educational inequalities because of the segregated school system.

4.3.4 Schools as "Equalizers"

Contrasting with the view that schools reinforce inequalities, the findings of several studies that have compared the development of educational inequalities during the school year and during the summer holidays have found that SES achievement gaps widen during the summer holidays. Learning rates among children when school is in session are very similar (Alexander et al., 2001; Downey et al., 2004). As learning during the summer holidays is shaped exclusively by non-school factors, this indicates that achievement gaps widen, because children are raised under unequal family conditions. During the school year, families continue to shape children's learning, but in addition, schools play an influential role. Although the gap between children from differing family backgrounds does not close during the school year, it does not widen as fast as it might otherwise have done. Without the influence of school, achievement gaps would expand to an even greater extent than they do with this influence. Thus, schools are viewed as the "great equalizer" relating to children's learning (Downey et al., 2004).

I deployed the same strategy of comparing learning rates during the school year with those during the summer holidays to investigate whether schools or family conditions influenced the differential development of children from contrasting socioeconomic backgrounds whose initial performance was similar. This leads to a fourth hypothesis on school effects.

Hypothesis 4 on school effects: The same pattern found in the literature for high- and low-SES children applies to high- and low-SES children who start their schooling equipped with similar reading and mathematics skills. Thus, low-SES children fall behind during the summer holidays and not during the school year, indicating that they fall behind because of unequal family environments, whereas schools partly compensate for these unequal family environments.

4.3.5 Children's competencies relating to their use of learning opportunities in school

Why may the effects of schools differ with respect to how well prepared children are when they start school? Sørensen and Morgan (2000) argue that the development of competencies in school depends on what students are taught, on the one hand, and on how much students learn from this content, on the other hand (Sørensen & Morgan 2000, p. 148). Schools differ with respect to the content and extent of what is taught. Moreover, students differ with respect to what they learn from these opportunities as a result of their acquired competencies, previous knowledge, and their own effort and motivation. Sørensen and Morgan (2000) argue that SES achievement gaps grow over time, not just because high-SES students attend better schools and thus have better learning opportunities at school than low-SES students, but because they make better use of these learning opportunities. They further argue that high-SES students can make better use of learning opportunities because, on average, they have

higher abilities and invest more effort in learning. Undertaking a comparison of children whose performance is similar at the beginning of their final preschool year ensures that their abilities to learn are similar. Thus, widening SES achievement gaps among children whose initial performance is similar do not reflect differences in how well children are able to avail of learning opportunities.

To sum up, Sørensen and Morgan (2000) argue that children who perform well at an early age are better able to avail of learning opportunities in school than children whose early performance is poor. This supports the following hypothesis.

Hypothesis 4a: The compensatory effect of schools is strongest for low-SES children with high skills at school entry, because they are better able to make use of the learning opportunities that they encounter in school.

4.3.6 Compensatory advantage

The third strand of the literature focuses on the mechanism of compensatory advantage (Bernardi, 2014; Grätz, 2015; Torche, 2016a). Accordingly, high-SES children are not only less likely to encounter obstacles in their schooling and later lives, but their parents are also better able to compensate for the obstacles and problems that their children encounter. For example, a child may not perform well at the beginning of school, because he or she is relatively younger than other children in the class. In this case, based on the mechanism of compensatory advantage, high-SES parents have the resources and knowledge to compensate for the poor performance of their children. They may be better able to support their children with homework, or they can pay for private tutoring. However, poor performance at school entry for children from low socioeconomic backgrounds could set them on a path-dependent process of cumulative disadvantage. Their teachers could have lower expectations of them and they themselves could develop the conviction that they are not good at school. Thus, according to the concept of compensatory advantage, "patterns of cumulative disadvantage and unfavorable path dependence are less prevalent among upper-class students" (Bernardi, 2014, p. 2). High-SES parents who wish to avoid downward social mobility may place a higher value on education, and they have more resources to compensate. Therefore, as stated in Hypothesis 1a on family effects, high-SES parents will attempt to compensate for the low-performance of their children. Therefore, this group will catch up over time.

4.3.7 Summary of the hypotheses

To sum up, this chapter brings together three strands of literature. The first compares the trajectories of children whose early cognitive abilities and performance are similar but whose family backgrounds differ (Blanden et al., 2012; Bradbury et al., 2015a; Feinstein, 2003; Schoon, 2006). I contribute to this strand of literature by investigating the mechanisms explaining why low-SES children fall behind their more advantaged peers, even if they initially demonstrated similar achievement levels.

The second strand of literature focuses on the roles of families and schools in creating educational inequalities. This literature entails a comparison of summer learning and school-year learning aimed at separating the effects of families and schools. I contribute to this literature by comparing children with different SES but similar skills in early life. These children are equally equipped to engage with the learning opportunities they encounter at school. In addition, I argue that family and schooling effects could differ depending on how well children perform at school. This argument draws in the third strand of literature on compensatory advantage. Bernardi (2014) and Torche (2016a) argue that socioeconomically disadvantaged children are not only more likely to face more obstacles and adverse conditions than children from better-off families, but their parents are less able to compensate for these obstacles.

Here, I provide a summary of the different hypotheses presented in this chapter:

Hypotheses on family effects:

- *Hypothesis 1*: Widening SES achievement gaps are caused by unequal family conditions.
  - *Hypothesis 1a*: High-SES parents will attempt to compensate for the poor performance of their children. Therefore, this group will catch up over time.
- *Hypothesis 2*: Because of selection, there are no further effects of families over and above children's abilities.

Hypotheses on school effects:

- *Hypothesis 3*: Because of the high level of socioeconomic segregation between schools in the United States, schools reinforce SES achievement gaps.
  - Hypothesis 3a: The reinforcing effects of schools are strongest among high-performing children. High-performing low-SES children have supportive parents, but they suffer most from being in schools with low-SES and low-performing students.
  - Hypothesis 3b: The reinforcing effects of schools are strongest among low-performing children. Regardless of their performance, high-SES children attend good schools in good neighborhoods. Therefore, low-performing, high-SES children benefit the most from advantageous school conditions.
- *Hypothesis 4*: Schools play a compensatory role for low-SES children, especially if these children have the same abilities to avail of learning opportunities in school as high-SES children.
  - Hypothesis 4a: Schools play a compensatory role for low-SES children, especially if these children are well equipped with skills to avail of learning opportunities in school.

4.4 A comparison of summer learning and school-year learning

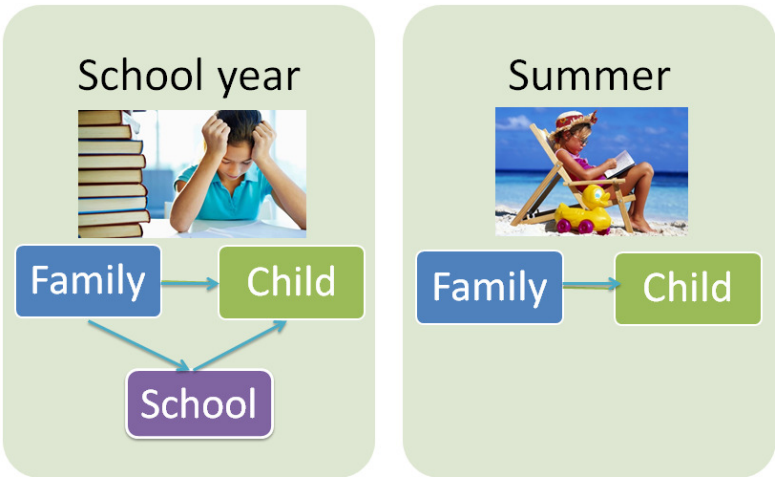
4.4.1 The methodological challenge

Researchers seeking to determine the roles of families and schools in relation to educational inequalities have to deal with the problem of how to separate family and school effects. If a child performs well in a test, or if his or her performance improves significantly from one test to the next, it is unclear whether this is because he or she attends a good school or because of strong support provided by the child's parents. In most cases, it is likely that parents who strongly support their children will also send their children to good schools.

4.4.2 Comparing summer learning and school-year learning

To separate the effects of families and schools, I undertook a comparison of how much children learn during the summer holidays and how much they learn during the school year. The rationale behind this analysis was that because schools are closed during the summer holidays, children's learning is solely influenced by non-school factors (see Figure 4.2). Families constitute the main non-school factor, but neighborhood characteristics may also play a role. During the school year, children's families continue to influence their learning. In addition, children receive instruction in schools. The difference between learning during the summer holidays and learning during the school year can be interpreted as the effect of schooling over and above the effect of families (Alexander et al., 2001; Alexander et al., 2007; Downey & Condron, 2016; Downey et al., 2004).

Figure 4.2: A visual depiction of the underlying rationale of the comparison between summer learning and school-year learning



4.4.3 Possible outcomes

If the growth rates of the achievement gap between students from different socioeconomic backgrounds are the same during the summer and the school year, then Hypothesis 1, stating that the SES achievement gap is caused by unequal family conditions, holds. In this case,

schools have no influence on the SES achievement gap. If the growth rate of the SES achievement gap is stronger during the school year than during the summer holidays, then Hypothesis 3, stating that schools reinforce socioeconomic inequalities, is supported. If the growth rate of the SES achievement gap is lower during the school year than during the summer holidays, then Hypothesis 4, which states that schools compensate for unequal family conditions, is confirmed.

4.4.4 Problems with the comparison of summer and school year learning

A comparison of summer learning and school-year learning presupposes that parents act in the same way during the school year as they do during the summer. Thus, the assumption is that in the absence of formal schooling, summer learning rates would apply throughout the year. Based on this assumption, the difference between summer learning and school-year learning can be interpreted as a schooling effect.

During the summer, all parents, including high-SES parents, would be expected to relax. However, we can further assume that high-SES parents may make a special effort to motivate their children and help with their homework during the school year, especially if their children do not do well in school. This assumption is based on the notion of compensatory advantage. It implies that parents behave differently during the summer and the school year, thereby contradicting the assumption underlying the comparison between summer learning and school-year learning. A comparison of summer learning and school-year learning aimed at separating family and school effects is based on the premise that in the absence of schools, children would learn as much as they do during the summer holidays. Therefore, changes in children's learning rates from the summer to the school year are attributed to schools. The assumption is that the family learning environment remains the same during the summer and the school year. Compensatory behavior, however, could mean that parents especially support their children during the school year. Therefore, my analysis also incorporated parents' behavior relating to education and how it changes over time.

4.5 Data

4.5.1 Dependent variables: Reading and mathematics scores

The ECLS-K: 2011 is a nationally representative longitudinal study of children in the United States. It encompasses tests of children's language skills and literacy along with their mathematical thinking skills. Children were tested in the fall and spring of the last kindergarten year and in the fall and spring of grade 1.[4] I was able to apply these data to estimate learning rates during the last kindergarten year, the summer holidays, and grade 1. In a future study, learning rates for grade 2 can also be analyzed, but these data were not yet available. A constraint associated with this study is that only one test was administered to

[4] The tests conducted in the fall of the first grade were administered to a random sample comprising 30% of schools.

children in higher grades. Consequently, learning during the summer holidays could not be distinguished from learning during the school year. Therefore, while I analyzed cognitive development of children aged 5 to 14 years, as discussed in chapter 3, in this chapter I limit my analysis to the early school years. I accept this narrower age range as a reasonable compromise in exchange for the possibility of comparing what children learn during the summer holidays to what they learn during the school year.

The same instruments were used for all four assessment rounds conducted in kindergarten and in grade 1. Questions which did not distinguish between students or those that were easy to guess were down-weighted.

Given my interest in determining whether family and school effects vary according to children's performance, I compared these effects among high- and low-performing children. This comparison hinged on the assumption that gains, in terms of size, at the lower end of the competence scale could be compared with gains at the higher end of the competence scale.[5]

In my view, this assumption cannot be practically tested. However, it was apparent that few of the scores were clustered at the top or the bottom of the test scores. This is because a two-stage design was implemented to reduce ceiling and floor effects. Students first took a brief "routing test" comprising items covering a wide range of difficulty levels. The results were used to design the main test comprising questions reflecting an "appropriate" level of difficulty (NCES, 2002).

4.5.2 Regression to the mean

Because I used children's test scores at the first measurement point as an independent variable, I had to contend with the problem of regression to the mean (see Chapter 3). Regression to the mean occurs because tests scores have two components: a "true" ability component and a random error component. The latter could be caused by temporary inattention or distraction, having a good day, lucky guessing, or having recently learned the answers to particular questions appearing in the test. The group of students with high scores on a test includes a disproportionate number of students with high positive random components. Conversely, the group of students with low scores includes a disproportionate number of students with low random components. Because this component is random, however, those with high random components for the first test will tend, on the whole, to have lower random components on the second test and vice versa (Treiman, 2009). That is, both the high and the low values move or regress toward the mean. This is true even when there is no change in the true value between the two measurements.

Because of my focus on SES achievement gaps, regression to the mean would pose a major problem if it differed according to students' SES. Though Jerrim and Vignoles (2013) argue

[5] I chose to use scale scores rather than theta scores, as interpretation of the former is more intuitive. As a robustness check, I again conducted all of the analyses using theta scores. The sizes of the coefficients changed as the scale was different. Theta scores ranged from -6 to +6, whereas scale scores range from 0 to 100. However, the direction of the coefficients was the same. None of the conclusions presented in the chapter changed as a result of using theta scores.

that regression to the mean differs by SES, as discussed in Chapter 3, I did not find strong evidence to support this view. Nonetheless, to validate my findings, I used the scores in reading tests conducted during the first wave to assess children's early skills and only focused on changes from the second wave onward. As regression to the mean is caused by random errors that are uncorrelated to subsequent random errors, measuring change after the second measurement point copes with regression to the mean. Thus, I focused on what children learned during the summer holidays and grade 1. I did not focus on what children learned during preschool, as this could be influenced by regression to the mean.

4.5.3 Explanatory variables

Parents' socioeconomic status

The SES measure comprised three components: family income, parents' highest occupational status, and their highest educational level. I averaged the SES measures in kindergarten and in grade 1, halving the measurement error. The SES ranged between -2.1 to 2.4 with a mean of zero and a standard deviation of 0.8.

School characteristics

It is difficult to measure the features of a good school. I used the average SES of the students attending a school as an indicator of its quality. In addition, I look at whether parents chose where to live to allow their children to attend a good school.

What children do during the summer

For the ECLS-K 2011 study, shortly after the start of the grade 1 session in the fall, parents were asked what their children did during the summer. From their responses, I determined whether children stayed with their parents or attended a summer camp or school, and who decided to send the child to a summer school.

Parents' education-related behavior

To investigate whether parents attempted to compensate if their children performed poorly at school, I analyzed parents' education-related behavior. As indicators of the general family learning environment I looked at whether the children watched television or played video games for three or more hours a day. I also examined whether parents read daily to their children. Using these two indicators, it was possible to investigate changes in parents' education-related activities with their children from the summer holidays to the school year.

To examine parents' compensatory behavior more specifically, I looked at how often parents helped their children with homework and whether they invested in private tutoring for their children. These two indicators were only applicable to the school year.

4.6 Findings

4.6.1 Diverging trajectories during preschool, summer, and grade 1?

To understand *why* low-SES students fall behind, and whether this can be attributed to families or schools, I investigated the question of *when* these students fell behind. Specifically, did they fall behind during the summer holidays or during the school year? Gaps between students from socioeconomically disadvantaged families and better-off students widen during the summer holidays when learning experiences are shaped primarily by families. During the school year, SES gaps remain constant (see Table A4.3). This finding suggests that achievement gaps are mainly caused by unequal family conditions. Without the influence of schools, gaps would widen even further. Thus, low-SES students fall behind more because of unfavorable family conditions than because of unfavorable school conditions. These findings are in line with the findings of earlier studies conducted with older cohorts (Alexander et al., 2001; Downey et al., 2004).

4.6.2 When do low-SES children fall behind their initially similarly performing peers?

I investigated whether the results changed when only students whose early performance was similar were compared. In other words, I aimed to determine how children whose initial performance levels were similar but whose parental SES was unequal developed. I found that when only children with similar test scores at the beginning of their final preschool year were compared, the growth of SES gaps became more pronounced than it did when initial performance was not controlled for (Table 4.1).

This finding was surprising, because high-performing children from socioeconomically disadvantaged families are a more unusual group compared with high-performing children from socioeconomically advantaged families. High-performing children from disadvantaged families are either especially smart, or their families are especially ambitious and supportive despite having fewer socioeconomic resources than advantaged families. Consequently, the finding that they fell behind their initially similarly performing peers was unexpected. The same argument applies to low-performing children from socioeconomically advantaged families, who are also an unusual group. Their parents may not invest sufficient time in school-related activities, or the children may not be very bright. Therefore, selection effects work in the reverse direction than the findings.

SES achievement gaps among children whose early performance was similar grew more during the school year than during the summer holidays (see model 4 in Table 4.1). This finding is surprising, because when early performance levels were not controlled for, SES gaps tended to be stable or even declined during the school year, whereas they widened

during the summer. This finding goes against Hypothesis 4, which states that schools compensate for a low-SES family background, especially if children have similar capacities to apply the learning opportunities they encounter at school.[6]

There are at least two possible explanations for this unexpected finding. Children with the same initial performance, but whose socioeconomic resource endowments at home differed, either attended schools of different quality or their parents reacted differently to their schooling. The finding that SES gaps widened during the school year, and not during the summer holidays, supports Hypothesis 3, which states that schools reinforce SES achievement gaps among children whose initial performance is similar. The fact that SES achievement gaps in reading widened mostly between children attending different schools provides further evidence in favor of the argument on school quality (see model 4 in Table 4.1). Thus, children whose performance at the beginning of preschool is similar, but whose parental SES differs, attend schools of different quality, which increases performance gaps between them. Before further investigating the underlying mechanisms in depth, I first examine whether effects vary among high- and low-performing children.

[6] How do these results fit together with the findings on SES achievement gaps in the literature? Schools accelerate learning mainly for low-performing students. These students learn more during the school year than they do during the summer holidays. As many low-SES students are low performers, they benefit more from schooling than do high-SES students. Because schooling closes achievement gaps, it tends to close SES gaps. However, when comparing only children with similar initial performances, it is apparent that high-SES students whose initial performance is low actually gain the most from schooling. Therefore, they catch up over time. This is surprising, because this is a potentially negatively selected group. However, because of the small size of this group, the overall pattern does not change.

Table 4.1: Correlations of learning rates with SES controlled for early performance within and between schools

		(1) Points gained per month, **kindergarten** b/se	(2) Points gained per month, **summer** b/se	(3) Points gained per month, **first grade** b/se	(4) Contrast: First grade - **summer** b/se
Overall	Reading score at t1	-0.01***	0.01***	-0.04***	-0.06***
		(0.00)	(0.00)	(0.00)	(0.00)
	SES	0.13***	0.05~	0.23***	0.18***
		(0.03)	(0.03)	(0.03)	(0.05)
	Constant	2.02***	1.15***	2.16***	1.02***
		(0.04)	(0.04)	(0.04)	(0.06)
Within schools	Reading score at t1	-0.01***	0.01***	-0.04***	-0.06***
		(0.00)	(0.00)	(0.00)	(0.00)
	SES	0.10**	0.07*	0.17***	0.10
		(0.04)	(0.04)	(0.04)	(0.06)
	Constant	2.02***	1.15***	2.18***	1.03***
		(0.03)	(0.03)	(0.03)	(0.05)
Between schools	Reading score at t1	-0.02*	0.01~	-0.05***	-0.07***
		(0.01)	(0.01)	(0.01)	(0.01)
	SES	0.23**	0.00	0.38***	0.37**
		(0.07)	(0.07)	(0.07)	(0.12)
	Constant	2.09***	1.26***	2.00***	0.74***
		(0.09)	(0.09)	(0.09)	(0.15)
	Observations	3010	3010	3010	3010

Source: ECLS-K 2011. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.
t1: beginning of the last preschool year. Reading scores at t1 were mean centered. Children's sex was controlled for. Students who changed schools were excluded from the results.

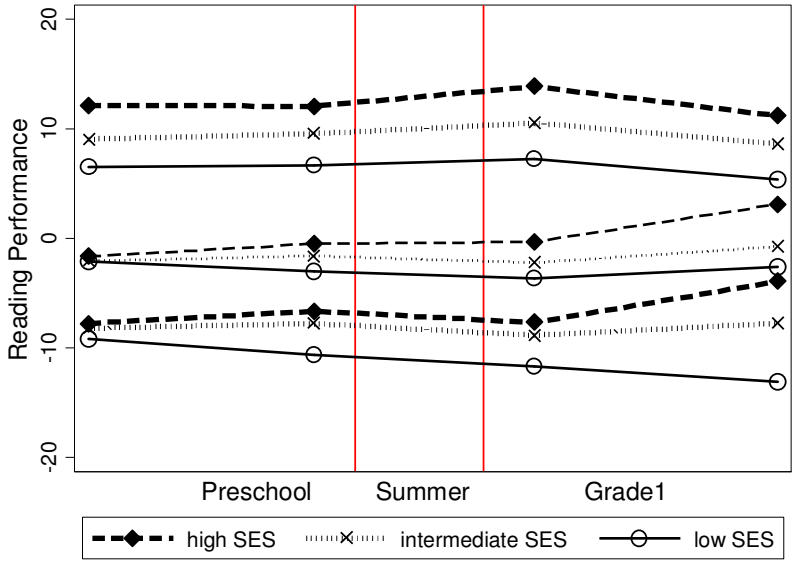
4.6.3 Are only low-performing low-SES children left behind?

Does children's progress in reading and mathematics and the roles of families and schools vary between high- and low-performing children? Figure 4.3 graphically depicts the results of my investigation relating to this question. *High-performing* children from different socioeconomic backgrounds learn at a similar pace during the summer holidays and during the school year. Thus, these children receive effective support from their parents whether or not they have ample socioeconomic resources. This finding goes against the position in the public debate that suggests that highly able children from low socioeconomic backgrounds perform well because they are genetically endowed.

SES achievement gaps only increase among *low-performing* children and not among high-performing children. As revealed by the pattern in Figure 4.3, which was demonstrated to be statistically significant in Table 4.2, high-SES students who perform poorly at the beginning of preschool catch up, moving from the lowest achievement tercile to the average over a

period of less than 2 years. This pattern is surprising, as they are an unusual group. Despite their parents' ample socioeconomic resources, they performed poorly in preschool. Moreover, this catching-up takes place during the school year and not during the summer holidays.

Figure 4.3: Reading development by initial performance during preschool, summer, and grade 1



Source: ECLS-K 2011

Table 4.2: Correlations of learning rates with SES controlling for early performance

		(1) Points gained per month, **kindergarten** b/ci95	(2) Points gained per month, **summer** b/ci95	(3) Points gained per month, **first grade** b/ci95	(4) Contrast: First grade - **summer** b/ci95
Overall	Parental SES	0.14***	0.05~	0.23***	0.17***
		[0.08,0.20]	[-0.00,0.11]	[0.17,0.28]	[0.07,0.26]
	Reading score at t1	-0.01***	0.01***	-0.03***	-0.05***
		[-0.01,-0.00]	[0.01,0.02]	[-0.04,-0.03]	[-0.06,-0.04]
	Parental SES # Reading score at t1	-0.02***	-0.00	-0.02***	-0.02***
		[0.03,0.18]	[-0.02,0.13]	[0.02,0.17]	[-0.09,0.16]
	Constant	2.08***	1.15***	2.23***	1.08***
		[2.00,2.15]	[1.08,1.22]	[2.16,2.30]	[0.96,1.19]
Within schools	Parental SES	0.12***	0.07~	0.16***	0.10~
		[0.05,0.19]	[-0.00,0.13]	[0.10,0.23]	[-0.01,0.21]
	Reading score at t1	-0.01**	0.01***	-0.03***	-0.05***
		[-0.01,-0.00]	[0.01,0.02]	[-0.04,-0.03]	[-0.06,-0.04]
	Parental SES # Reading score at t1	-0.01***	-0.00	-0.02***	-0.02***
		[0.03,0.18]	[-0.02,0.14]	[0.00,0.16]	[-0.10,0.15]
	Constant	2.07***	1.16***	2.24***	1.08***
		[2.02,2.13]	[1.10,1.21]	[2.18,2.29]	[0.99,1.17]
Between schools	Parental SES	0.27***	0.02	0.41***	0.39**
		[0.13,0.42]	[-0.12,0.16]	[0.26,0.55]	[0.15,0.62]
	Reading score at t1	-0.02~	0.01~	-0.04***	-0.06***
		[-0.03,0.00]	[-0.00,0.03]	[-0.06,-0.03]	[-0.09,-0.03]
	Parental SES # Reading score at t1	-0.02*	-0.00	-0.03***	-0.03*
		[-0.04,-0.01]	[-0.02,0.02]	[-0.05,-0.01]	[-0.06,-0.00]
	Constant	2.17***	1.27***	2.04***	0.78***
		[1.97,2.37]	[1.07,1.46]	[1.85,2.24]	[0.45,1.10]
	Observations	3432	3432	3432	3432

Source: ECLS-K 2011. 95% confidence interval in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered. Children's sex was controlled for.

4.6.4 Schools or families?

The question then is why high-SES children catch up during the school year. According to the school-based explanation, more advantaged families tend to live in richer neighborhoods with better schools than disadvantaged families. The finding that low-performing high-SES students catch up during the school year suggests that these students gain from their

attendance of good schools. The school-based explanation is further supported by the fact that SES achievement gaps increase between children attending separate schools (table 4.1). Therefore, inequalities between schools appear to play a role.

The alternative, family-based explanation posits that parents react differently to their children's schooling. If they realize that their children are behind their peers in grade 1, they may try to compensate for this low performance. High-SES parents will be more successful at supporting their children with homework or they will pay for private tutoring. The fact that SES achievement gaps grow mainly among low-performing children hints at attempts by high-SES parents to compensate for the low performance of their children. To test the family- and school-based explanations further, I conducted a closer examination of the schools attended by children and of the activities of children and parents during the summer holidays and the school year.

4.6.4.1 Schools

My investigation of the school-based explanation begins with an examination of the mean SES of the student body in schools.

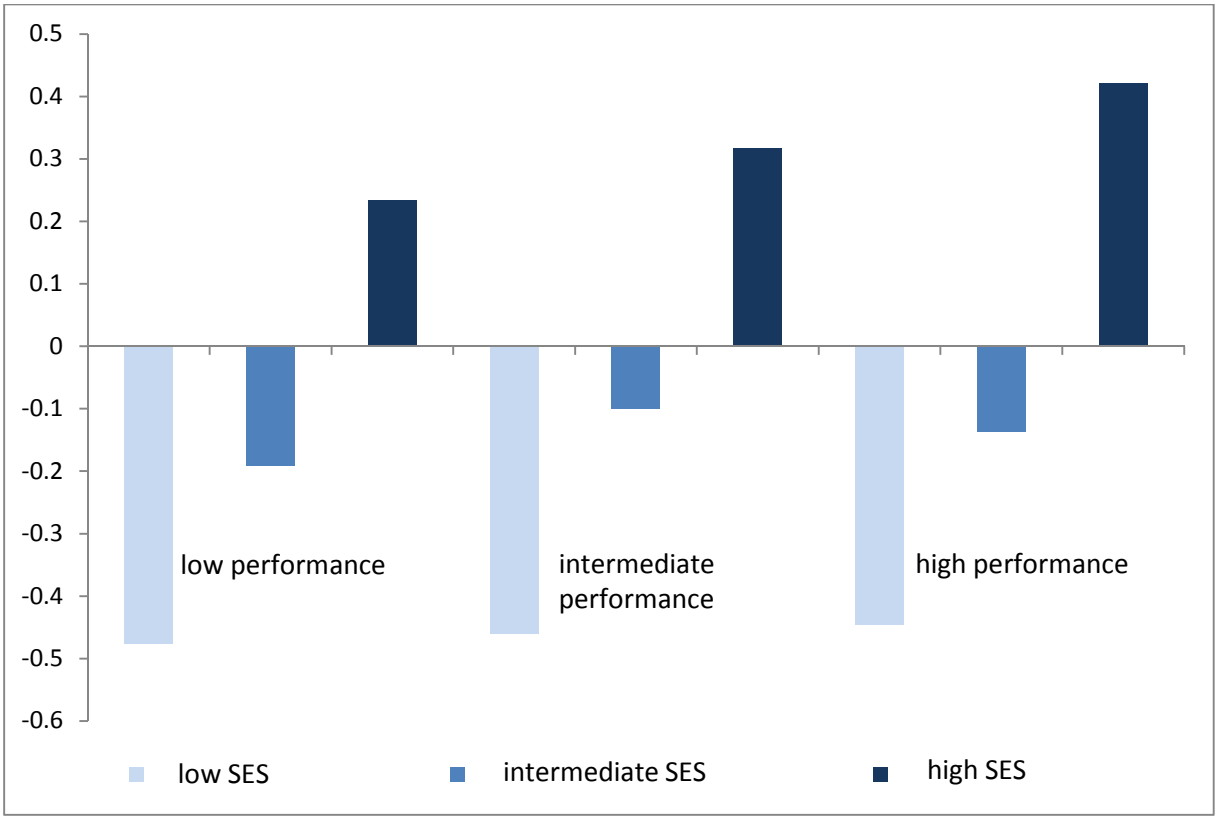
Moving to good schools

About one-third of the families in the ECLS-K 2011 study (34%) chose their residential locations to allow their children to attend a good school. The proportion of high-SES families who did so was the highest at more than 40%, but even among low-SES families, more than a third of all families did so. This proportion was impressively high, and the gaps by parents' SES were narrow. Notably, low-SES families with high-performing children were most likely to have chosen their residential locations in a way that would allow their child to attend a high-quality school (see Figure A4.3 in the Appendix).

School characteristics

Even though low-SES parents with high-performing children were the group most likely to have chosen where to live to enable their children to attend a school of high quality, they did not manage to send their children to schools with a higher proportion of high-SES students (see Figure 4.4). Low-SES students evidently attended schools with other low-SES children no matter how they performed. This is surprising and goes against the hypothesis that low-SES students attend favorable schools if they have ambitious parents or are especially bright. In reality, not even high-performing low-SES students attend schools with a higher proportion of high-SES students. High-SES children attended schools with other high-SES children at all levels of the competence distribution. If the school composition is an indicator of school quality, the inequality in school quality related to parents' SES was thus widest among high-performing children (see Figure 4.4).

Figure 4.4: The mean SES of students in a child's school depending on parents' SES and students' performance



Source: ECLS-K 2011.

The effect of mean school SES

My comparison of summer learning and school-year learning was aimed at assessing the effect of schooling in comparison to no schooling. I further investigated the effect of attending one school and not another. More specifically, I investigated the effect of attending an advantaged school compared with attending a disadvantaged school in terms of peers and most probably in school quality.

Children attending schools with larger numbers of high-SES students learned more than their peers in schools with predominantly low-SES students. School characteristics were found to be more decisive for children from socioeconomically disadvantaged families (see Table 4.3 and Figure 4.5). For high-SES children the effect approached zero, but this was not precisely estimated. Thus, while high-SES students largely learned independently of their schools' mean SES, low-SES students learned more if they attended schools with a higher share of higher-SES students. Children with a lower SES of one standard deviation learned about 0.3 points more per month if they attended schools with a SES that was one standard deviation higher compared with the mean SES of an average school (see Figure 4.5). This effect was

not huge, but as the average learning rate was about 2 points per month, it was still substantive.

A school's mean SES composition was only associated with children's learning rates during the school year (see Table 4.3). This indicates that students attending schools with a higher intake of students from socioeconomically advantaged backgrounds were not only positively selected because their families had chosen a good school or lived in advantaged neighborhoods; it also indicates the effect of better schools. This was true even when controlling for children's earlier abilities.

To sum up, schools' characteristics help to explain why low-SES children fall behind their peers from better-off families. Whereas low-SES children would benefit most from schools with a higher share of high-SES students, they normally attend schools with a higher intake of more disadvantaged students compared with their peers from better-off families.

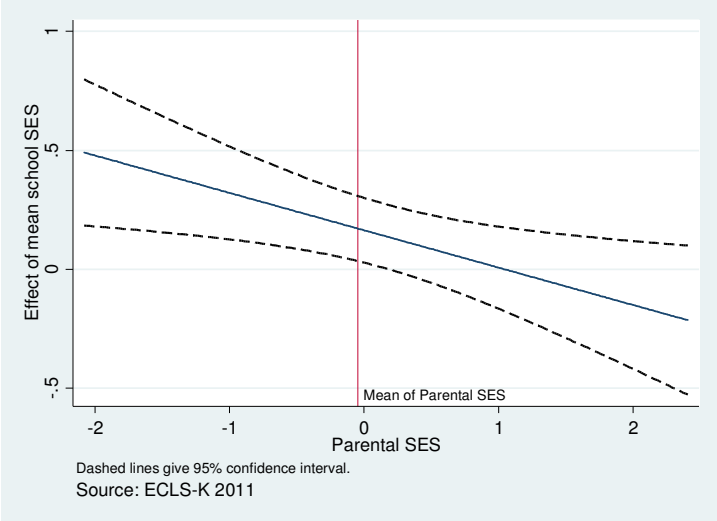
High-SES but low-performing students attend more favorable schools than their low-SES peers whose performance is similar. However, the gap in school conditions is widest among high performing children. In addition, the effect of schools is less clear for high-SES students. Consequently, school characteristics do not explain why high-SES children who perform poorly catch up during the school year. For this reason, I also examined parents' education-related behavior.

Table 1.3: Influence of the mean SES of students attending a school on monthly learning rates by season

	(2) Points gained per month, **kindergarten** b/ci95	(3) Points gained per month, **summer** b/ci95	(4) Points gained per month, **first grade** b/ci95	(5) Contrast: First grade - summer b/ci95
Parental SES	0.16***	0.06	0.22***	0.16*
	[0.08,0.24]	[-0.03,0.16]	[0.13,0.31]	[0.01,0.31]
Schools' mean SES	0.05	0.03	0.16*	0.13
	[-0.10,0.19]	[-0.12,0.18]	[0.03,0.30]	[-0.10,0.37]
Parental SES# Schools' mean SES	-0.19**	0.07	-0.16*	-0.23~
	[-0.31,-0.07]	[-0.09,0.23]	[-0.28,-0.03]	[-0.46,0.00]
Reading score at t1	-0.01***	0.02***	-0.05***	-0.06***
	[-0.02,-0.01]	[0.01,0.02]	[-0.05,-0.04]	[-0.07,-0.05]
Constant	2.15***	1.10***	2.29***	1.19***
	[2.07,2.24]	[1.01,1.20]	[2.22,2.36]	[1.05,1.33]
Observations	3256	3256	3256	3256

Source: ECLS-K 2011. 95% confidence interval in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Children's sex was controlled for.

Figure 4.5: Influence of the mean SES of students attending a school on monthly learning rates by parents' SES, controlling for early performance



4.6.4.2 The family learning environment

The school-based explanation does not fully account for why low-performing but high-SES students catch up during grade 1. The alternative family-based explanation is that high-SES parents will try to compensate for the fact that their children lag behind and will help their children with homework or invest in private tutoring.

To develop a profile of the family learning environment and parents' education-related behavior, I examined the time spent by children watching television or playing video games as well as several means whereby families could support children. As an indicator of parents' engagement in education-related activities with their children, I looked at whether parents read daily to their children. This question applied to both the summer holidays and term time, thereby providing responses that indicated whether parents' education-related activities differed during the summer and during term time. The two other indicators for family behavior relating to education measured parents' compensatory behavior more directly. The first assessed how often parents helped their children with homework and the second determined whether children were tutored privately. Helping with homework is possible only during term time, so I could not measure changes from the summer to the start of the school year. Private tutoring during the summer holidays is very unusual. Therefore, I focused on private tutoring during grade 1. I hypothesized that high-SES parents whose children performed poorly would exhibit the highest levels of compensatory behavior.

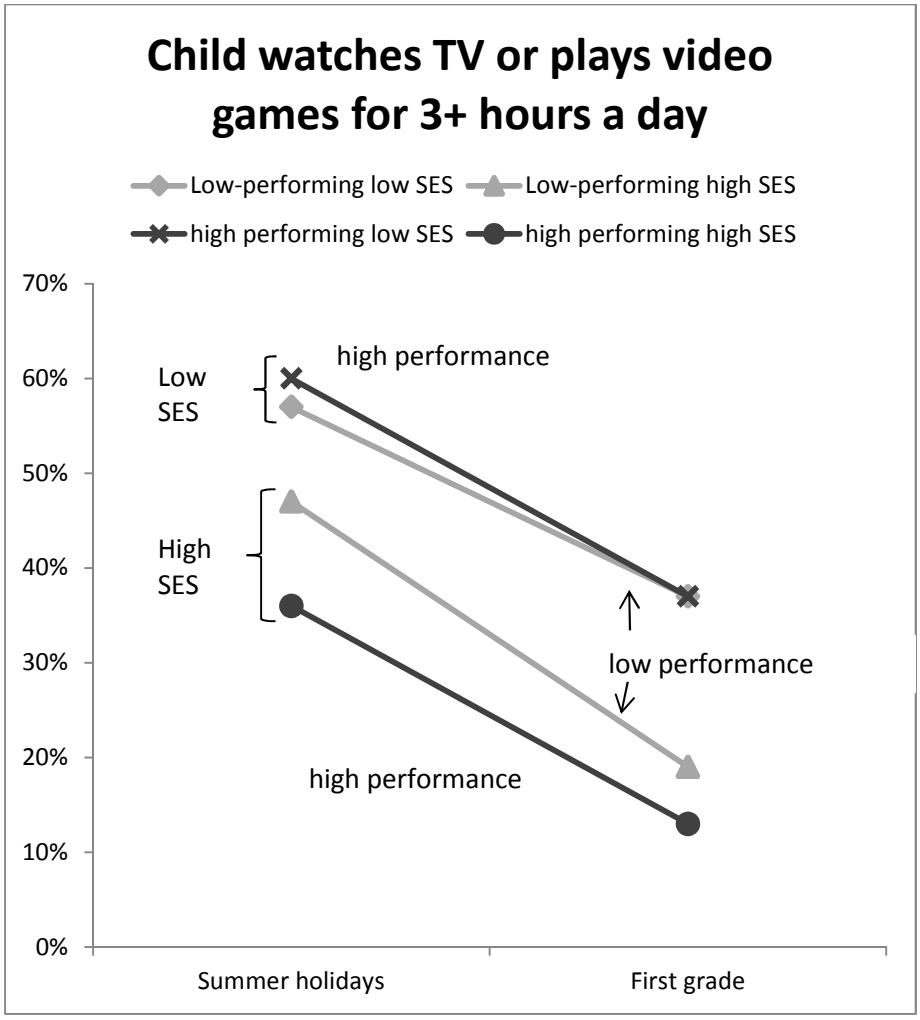
Watching television or playing video games

Children watched less television during the school year than during the summer holidays. During the summer holidays, 60% of low-SES children and 37% of high-SES children watched television or played video games for at least 3 hours a day (see Figure 4.6). This percentage was halved for all groups during the school year. Thus, inequalities in family

learning environments remained the same during the summer holidays and the school year. Based on this finding, it is evident that the assumption that inequality in family learning environments remains the same holds true for television viewing.

Differentiation students not just by parents' SES but also by their performance revealed that all of the low-SES children watched a lot of television, regardless of their performance. Compared with high-SES students who performed well, high-SES students who performed poorly watched more television. This finding confirms that high-SES children who perform poorly are a negatively selected group. Their parents may have less time or be less willing to actively spend time with their children. However, it is for this group of low-performing high-SES children that TV watching decreased most from the summer to the school year. Therefore, the SES gap in TV watching between low-performing students increased from the summer holidays to the school year from 10 to 18 percentage points. As shown in Table A4.12, this result was also statistically significant. This finding parallels the pattern of a greater increase in the SES achievement gap in reading during the school year compared with the increase in this gap during the summer holidays among low-achieving students. It also indicates that high-SES parents may try to compensate for the low performance of their children. Specifically, they may reduce the number of hours that they permit their children to watch television from the summer holidays to the school year.

Figure 4.6: Children's media consumption according to their performance and parents' SES.



Source: ECLS-K, 2011.

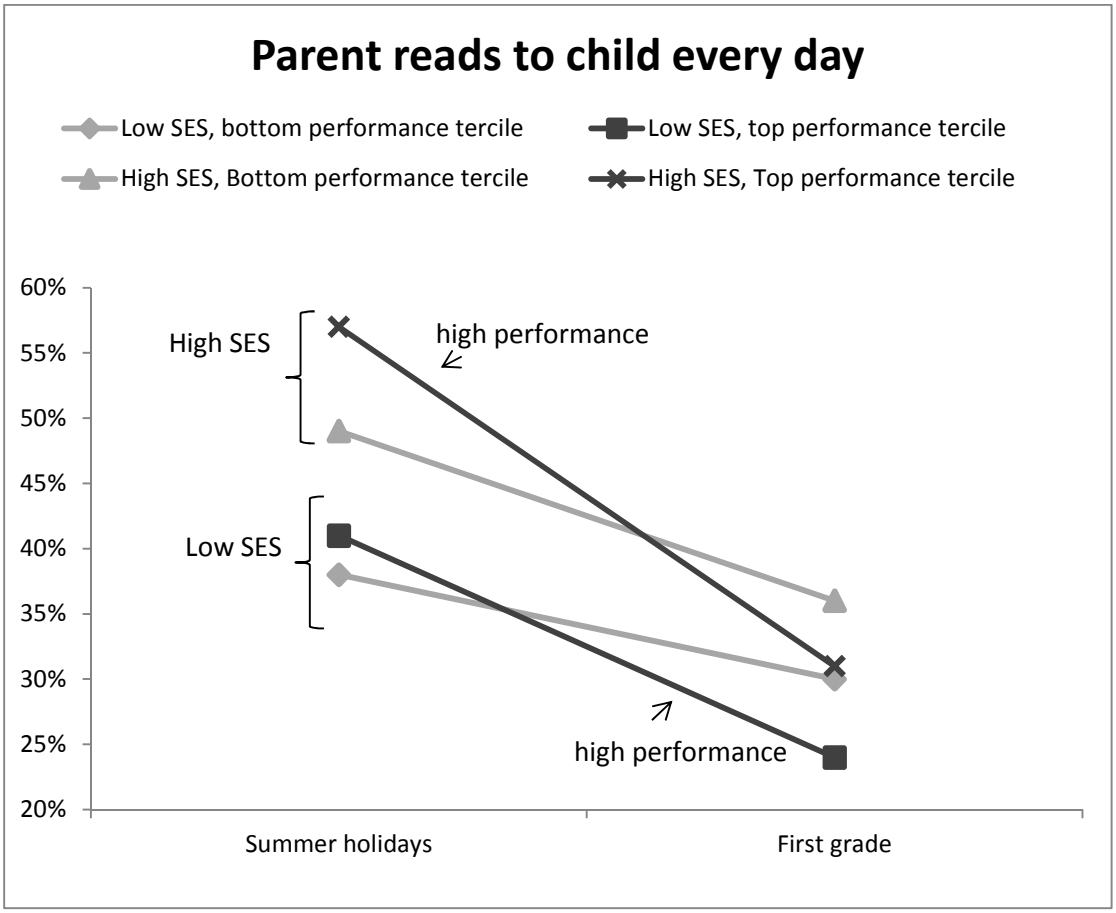
Parents reading to their children

During the summer holidays, parents' reading behavior matched expectations: high-SES parents read to their children more frequently than did low-SES parents. Whereas 40% of low-SES parents read to their children every day, more than 60% of high-SES parents did so (Figure 4.7). At the same time, variance within the group of high- and low-SES parents was also evident. Within each SES group, parents of high-performing children read to them more often than did parents of low-performing children. This finding is expected, indicating that children perform differently because of differences in the amount of time and other resources that their parents invest in them, despite having the same levels of socioeconomic resources. Put another way, both within high- and low-SES groups, children whose parents read to them performed better than children whose parents did not read with them.

During grade 1, parents read less often to their children than they did during the summer holidays. The reduction in reading to children was greatest among parents of high-performing

children. Thus, parents' reading behavior was more compensatory and there was a marked decrease in the SES gaps in parents' reading behavior from 20 to 5 percentage points. Thus, contrary to the assumption that inequality between family learning environments is similar during the summer holidays and the school year, parental reading behavior was found to vary less by socioeconomic background during the school year than during the summer holidays. Accordingly, schooling evidently prompts changes in family behavior. Remarkably, within each SES group, parents of low-performing children were more likely to read daily to their children than were parents of high-performing children. Thus, during term time, parent's reading behavior became more compensatory. This was true for both high- and low-SES parents. This finding indicates that during grade 1, high-SES parents whose children performed poorly were most likely to read daily to their children (Figure 4.7)

Figure 4.7: Relation between parents' reading to their children and children's performance according to parents' SES.



Source: ECLS-K 2011.

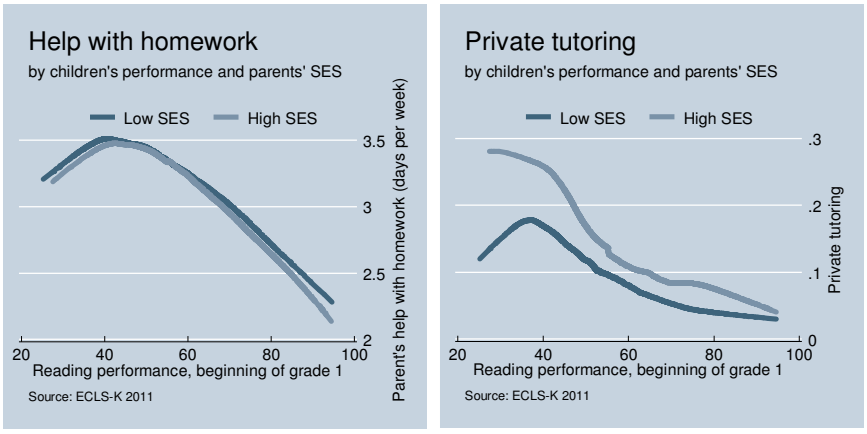
Compensation: Help with homework and private tutoring

Low-performing children were helped more often by their parents with their homework than were high-performing children (see Figure 4.8, left side). This finding was independent of children's SES. Given marginal differences in parental support with homework, this factor

cannot explain growing achievement gaps by SES. However, the quality of help with homework was not taken into account. To sum up, most families provided their children with extra support when they did not do well in school, irrespective of parents' SES.

By contrast, the prevalence of *private* tutoring depended on parents' SES. Like support with homework, private tutoring varied strongly with children's performance: low-performing children received private tutoring, whereas high-performing children did not (see Figure 4.8, right side). The SES achievement gap was found only among low-performing children. The vast majority of high-performing children were not tutored privately (only 3% of these children were tutored), regardless of the SES of their parents. Among low-performing children, whereas nearly 30% of high-SES children received private tutoring, only about 10% of low-SES children were privately tutored. Thus, even though all children received more support with their homework when they did not do well in school, more high-SES parents than low-SES parents invested in private tutoring when their children performed poorly in school.

Figure 4.8: Relation between support in school and performance according to parents' SES.



I included private tutoring as an explanatory variable to determine whether it could explain the growing SES achievement gap among low-performing students. However, the interaction effect remained unchanged. Consequently, it is evident that private tutoring alone could not explain the growing SES achievement gaps among low-performing children in grade 1.

To sum up, in general, parents of low-performing children demonstrated compensatory behavior during the school year. Parents of low-performing children read to them more often during the school year than did parents of high-performing children. During the summer, the pattern was reversed. Parents whose children performed poorly also supported their children with homework more often. Thus, (nearly) all parents tried to give their children additional support if they did not perform well in school. However, given higher levels of resources, high-SES parents may have been more successful. If their children performed poorly, they could pay for private tutoring and reduce the amount of time that their children were permitted to watch television.

4.7 Conclusion and Discussion

4.7.1 Why are so many low-SES children left behind?

Why do so many children from socioeconomically disadvantaged families fall behind their peers from better-off families during their early school years? One explanation may be that they have different capacities to make use of the learning opportunities that they encounter. To rule out this explanation, I compared children with similar test scores at the beginning of preschool and still found that the trajectories of these children differed. So, why do children equipped with similar skills but with different socioeconomic backgrounds diverge in their reading development trajectories? Do they fall behind because they receive less support at home or does this happen because they attend worse schools than their more advantaged peers?

4.7.2 Comparing learning during the summer holidays and during the school year

To address the question of *why* children fall behind, I first analyzed *when* children fall behind. If low-SES children fall behind during the summer holidays when schools are closed, this would indicate that the explanation lies in family effects. If low-SES children fall behind only during the school year, this indicates that schooling effects may br the cause.

4.7.3 SES achievement gaps remain constant among high-performing students

Based on my analysis of data from the ECLS-K 2011 study conducted in the United States, I found that from about the ages of 5 to 7 years, SES achievement gaps among students whose initial performance was similar only widened among low-performing students. There were also SES achievement gaps among high-performing children. However, from about ages 5 to 7 years, these gaps largely remained constant. High-performing low-SES students did not fall behind during the summer holidays. This finding is remarkable, as they were disadvantaged by their SES. However, as they did well in mathematics and reading, it is likely that they enjoyed a supportive family environment even though their families were socioeconomically disadvantaged. Thus, highly able children from low socioeconomic backgrounds do not perform well because they are "genetically endowed" and consequently perform well despite being raised in disadvantageous family conditions. Contrary to this belief, despite having fewer resources than high-SES parents, low-SES parents of high-achieving students are strongly supportive of their children. Nonetheless, as Chapter 3 has shown, high-performing low-SES students fall behind over the course of their schooling.

4.7.4 Growing SES achievement gaps among low-performing students

SES achievement gaps widened among low-performing children. Low-SES children were left behind, whereas high-SES children whose initial performance was poor caught up, progressing from the bottom tercile to the average level in less than 2 years. This finding is

striking as poorly performing children from high-SES families are a negatively selected group. How, then, can this finding be explained?

4.7.5 Inequalities between schools

Low-performing students from disadvantaged families mainly fell behind their peers from better-off families during the school year and not during the summer holidays. The finding that high-SES children caught up during the school year indicates that high-SES students attended better schools than their peers from disadvantaged families. This school-based explanation is further supported by the fact that SES achievement gaps increase mainly among children attending different schools and less among those attending the same school. A closer examination of children's schools reveals that high-SES students attend schools with other high-SES students and low-SES students attend schools with other low-SES students. Students from low-SES families especially tend to learn more if they attend schools with more high-SES students than if they attend schools with other disadvantaged students. However, in the segregated US school system, low-SES students generally attend schools with other disadvantaged students.

4.7.6 Compensatory advantage

All of these findings support the hypothesis that SES achievement gaps among children whose initial performance was similar widen because they attend schools of differing quality. However, the school-based explanation cannot explain why SES achievement gaps only increase among low-performing students. This finding points to another family-based mechanism, namely compensatory advantage (Bernardi, 2014; Torche, 2016b). Accordingly, high-SES parents are better able to compensate for the low performance of their children by giving them extra support. A closer examination of families' education-related behavior revealed the occurrence of compensatory behavior. For example, parents whose children performed poorly in school supported them with homework more often than parents of children who performed well. Similar to the findings of Chin and Phillips (2004) who applied a qualitative methodology in their study, this finding held for high- and low-SES parents alike. However, high-SES parents were more likely to pay for private tutoring if their children performed poorly.

The mechanism of compensatory advantage suggests that families behave differently during the summer and during the school year. During the summer holidays, parents of poorly performing children read less often to them than parents with a comparable SES whose children perform well. However, during the school year, compensatory behavior becomes apparent, because the relationship reverses and parents of low-performing children read more often to their children than do parents of high-performing children. This finding overturns the assumption underlying the comparison of summer learning and school-year learning, namely that family behavior remains the same during the summer holidays and the school year.

In general, compensatory behavior is apparent among all parents of low-performing children. This does not depend on parents' SES. There are weak indications pointing to more compensatory behavior among high-SES parents when it comes to how long children are allowed to watch television. Nonetheless, high-SES parents may be more successful in supporting their children and have more resources to do so than low-SES parents.

To sum up, my findings support both the school-based explanation and the family-based explanation as to why so many low-SES children fall behind their peers from better-off families.

4.8 Appendix

4.8.1 Learning during preschool, summer and first grade

rom age 5 to 7, during their final year of preschool and in first grade, children make enormous progress in reading and mathematics (figure A4.1 for reading). Their test scores in reading and mathematics nearly double over this period. Children gain most of their new competencies when school is in session during preschool and first grade, and learn less during the summer holidays. This is visible in figure A4.1, in which learning rates are flatter during the summer break and steeper during preschool and first grade. This pattern indicates that schools and (to a lesser extent) preschools are successful in accelerating learning. In reading, children improve twice as fast during first grade when compared to learning during the summer months (table A4.1). Whereas they gain about 1 point on the reading test per month during summer, they gain about 2 points per month during the school year. This is a lower bound estimate of the effect of schooling, as, on average, children are tested a bit more than one month before and a bit more than one month after the summer holidays. Thus the estimate for learning during the summer includes not only three months of summer holidays but also 2.5 months of schooling. To sum up, schools accelerate learning.

Figure A4.1: Relation between Reading performance and season.

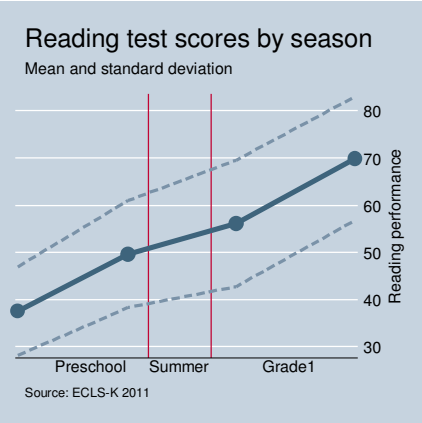


Table A4.1: Monthly learning rates in reading and mathematics, by season.

	Monthly learning rates in reading	Standard deviation	Number of obs.
Final preschool year	2.07	1.14	3848
Summer	1.10	1.11	3848
First grade	2.17	1.19	3848
Difference first grade - summer	1.08	1.86	3848

Source: ECLS-K 2011

4.8.2 Cumulative disadvantage by earlier performance?

Does learning beget learning (Cunha & Heckman, 2010; Heckman, 2006; Stanovich, 1986)? Or do low-achieving students catch up with their peers? According to the data, high-achieving children leave their lower achieving peers behind only during the summer holidays, when schools are closed and learning is influenced by non-school factors only. During preschool and first grade, when instruction is in place, initially low-performing children catch up to their higher-performing peers. This is visible in table A4.2, where test scores at the beginning of children's final preschool year are negatively correlated with learning rates during preschool and first grade. However, the correlation is positive during the summer. That means that those with higher test scores already at the beginning learn more than their lower performing peers. When school is in session, however, the high-achieving kids learn less than their lower performing peers, so that the correlation is negative. Thus, initially low-performing children catch up to their higher performing peers when school is in session, whereas they fall behind during the summer.

Schooling decreases performance gaps among high- and low-performing children, whether they attend the same or separate schools. The equalizing effect of schooling also seems to be rather similar for reading and mathematics. This is opposite to the hypothesis that the effect might be strongest in mathematics, where learning occurs mainly through systematic instruction.

Table A4.2: Correlation of learning rates with initial knowledge within and between schools.

		(1) **Kindergarten**, points gained per month b/se	(2) **Summer holidays,** points gained per month b/se	(3) **Grade 1**, points gained per month b/se	(4) Contrast: Grade1 - summer b/se
overall	Reading score at t1	-0.01***	0.02***	-0.03***	-0.05***
		(0.00)	(0.00)	(0.00)	(0.00)
	Constant	2.01***	1.14***	2.12***	0.99***
		(0.04)	(0.03)	(0.04)	(0.06)
Within schools	Reading score at t1	-0.01***	0.02***	-0.04***	-0.05***
		(0.00)	(0.00)	(0.00)	(0.00)
	Constant	2.01***	1.14***	2.13***	0.99***
		(0.03)	(0.03)	(0.03)	(0.04)
Between schools	Reading score at t1	-0.00	0.02**	-0.02***	-0.04***
		(0.01)	(0.01)	(0.01)	(0.01)
	Constant	2.08***	1.26***	1.97***	0.71***
		(0.10)	(0.10)	(0.11)	(0.17)
	Observations	3607	3607	3607	3607

ource: ECLS-K 2011. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

4.8.3 Cumulative disadvantage by parents' SES?

How do performance gaps among children with different socioeconomic statuses evolve over time? SES performance gaps are larger at the end of first grade than they are when children enter preschool. A one standard deviation lower SES corresponds to a disadvantage of about 5 points in the reading test at the beginning of preschool. This gap corresponds to what children learn in about one third of a school year or nearly double the gap between black and white children. At the end of preschool, the gap has risen to 7 points, corresponding to about half a school year of learning. Thus, SES gaps increase over time.

How are performance gaps among children with different socioeconomic statuses affected by schooling? Gaps in reading and mathematics performance among children with different levels of socioeconomic resources at home grow strongest during the summer. The gaps grow less during first grade and preschool. Unlike the gaps between high- and low-performing children, however, SES gaps do not decrease in first grade. Yet, they grow less than they do during the summer, when schools are closed.

Multilevel models reveal that schools can stop the growth of inequality among children with different SES if they attend the *same* schools. Performance gaps among children with different SES who attend the same school decline during the school year. For children with

different SES attending *separate* schools, this is not true. This indicates that schools offer similar learning opportunities to students attending the same schools, independent of their parents' socioeconomic status. The similar learning opportunities offered by schools contribute to reducing inequality due to unequal learning environments at home. However, when students with different SES attend separate schools, these seem to be of different quality meaning that schooling cannot attenuate inequalities generated by different family environments.[7]

Table A4.3: Correlation of learning rates with SES, within and between schools, only children who did not change schools.

		(1) Points, beginning of kindergarten	(2) Points gained per month, kindergarten	(3) Points gained per month, summer	(4) Points gained per month, first grade	(5) Contrast: First grade - summer
		b/se	b/se	b/se	b/se	b/se
Overall	Parental SES	4.98***	0.08**	0.12***	0.01	-0.11*
		(0.21)	(0.03)	(0.03)	(0.03)	(0.05)
	Constant	37.97***	2.02***	1.15***	2.13***	0.98***
		(0.27)	(0.04)	(0.03)	(0.04)	(0.06)
Within schools	Parental SES	4.54***	0.06~	0.13***	-0.02	-0.14**
		(0.25)	(0.03)	(0.03)	(0.04)	(0.06)
	Constant	37.95***	2.01***	1.15***	2.14***	0.98***
		(0.20)	(0.03)	(0.03)	(0.03)	(0.04)
Between schools	Parental SES	6.11***	0.13*	0.11*	0.07	-0.03
		(0.42)	(0.06)	(0.05)	(0.06)	(0.09)
	Constant	37.54***	2.11***	1.26***	1.96***	0.69***
		(0.75)	(0.10)	(0.10)	(0.10)	(0.17)
Observations		3432	3432	3432	3432	3432

Source: ECLS-K 2011. Results controlled for children's sex. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

4.8.4 Cumulative disadvantage by race and SES

This above finding suggests that *SES* achievement gaps are mainly caused by unequal family conditions, whereas schools equalize performance. Without schools, gaps would grow even further. For race and migration background, on the other hand, I find the opposite: Black, Hispanic or Asian

[7] During the summer holidays, gaps among children with different SES grow to a similar extent, whether they attend the same schools or not. Therefore, the difference during the school year is not due to selection effects into schools.

children fall behind during the school year and not during the summer (Table A4.4). This suggests that schools enlarge racial inequalities. This is supported further by the fact that racial inequalities mainly grow between schools, indicating that different racial groups attend segregated schools and thus encounter different learning opportunities in school. These findings are in line with findings in earlier studies (Alexander et al., 2001; Downey et al., 2004).

Table A4.4: Correlation of children's learning rates with their race.

	(1) Points, beginning of kindergarten b/ci95	(2) Points gained per month, kindergarten b/ci95	(3) Points gained per month, summer b/ci95	(4) Points gained per month, first grade b/ci95	(5) Contrast: First grade - summer b/ci95
black	-2.56***	-0.30***	0.01	-0.18*	-0.18
	[-3.75,-1.37]	[-0.45,-0.15]	[-0.14,0.16]	[-0.33,-0.02]	[-0.43,0.07]
hispanic	-4.42***	-0.14**	-0.02	-0.18**	-0.16~
	[-5.26,-3.58]	[-0.24,-0.04]	[-0.12,0.09]	[-0.28,-0.07]	[-0.33,0.01]
asian	2.06**	0.15~	0.31***	-0.38***	-0.69***
	[0.79,3.32]	[-0.00,0.31]	[0.16,0.47]	[-0.55,-0.21]	[-0.95,-0.42]
other	-0.75	0.09	0.01	-0.05	-0.06
	[-2.04,0.54]	[-0.08,0.25]	[-0.15,0.17]	[-0.22,0.12]	[-0.34,0.21]
Constant	39.39***	2.12***	1.15***	2.28***	1.13***
	[38.71,40.07]	[2.04,2.20]	[1.07,1.23]	[2.20,2.36]	[1.00,1.26]
black	-1.89**	-0.24**	-0.05	-0.08	-0.03
	[-3.20,-0.58]	[-0.41,-0.08]	[-0.22,0.12]	[-0.26,0.10]	[-0.31,0.25]
hispanic	-3.54***	-0.08	-0.03	-0.08	-0.05
	[-4.52,-2.57]	[-0.21,0.04]	[-0.16,0.09]	[-0.22,0.05]	[-0.26,0.16]
asian	1.84**	0.19*	0.24**	-0.33***	-0.57***
	[0.49,3.18]	[0.02,0.37]	[0.07,0.41]	[-0.52,-0.15]	[-0.86,-0.29]
other	-0.11	0.11	0.02	-0.06	-0.08
	[-1.45,1.23]	[-0.06,0.28]	[-0.15,0.19]	[-0.25,0.12]	[-0.37,0.20]
Constant	39.02***	2.09***	1.17***	2.24***	1.07***
	[38.47,39.57]	[2.02,2.17]	[1.10,1.24]	[2.16,2.31]	[0.95,1.18]
black	-4.85***	-0.60***	0.26~	-0.41*	-0.67*
	[-7.70,-1.99]	[-0.92,-0.28]	[-0.05,0.57]	[-0.74,-0.07]	[-1.21,-0.14]
hispanic	-7.09***	-0.29**	0.02	-0.32**	-0.34*
	[-8.78,-5.40]	[-0.48,-0.10]	[-0.16,0.21]	[-0.51,-0.12]	[-0.66,-0.02]
asian	5.79**	-0.03	0.63**	-0.54*	-1.17**
	[1.97,9.61]	[-0.46,0.40]	[0.21,1.04]	[-0.99,-0.10]	[-1.89,-0.45]
other	-8.17***	0.04	-0.14	0.14	0.28
	[-12.89,-3.45]	[-0.49,0.56]	[-0.65,0.38]	[-0.41,0.70]	[-0.61,1.17]
Constant	40.82***	2.22***	1.10***	2.34***	1.25***
	[39.67,41.97]	[2.09,2.35]	[0.97,1.22]	[2.21,2.48]	[1.03,1.46]
Observations	3599	3599	3599	3599	3599

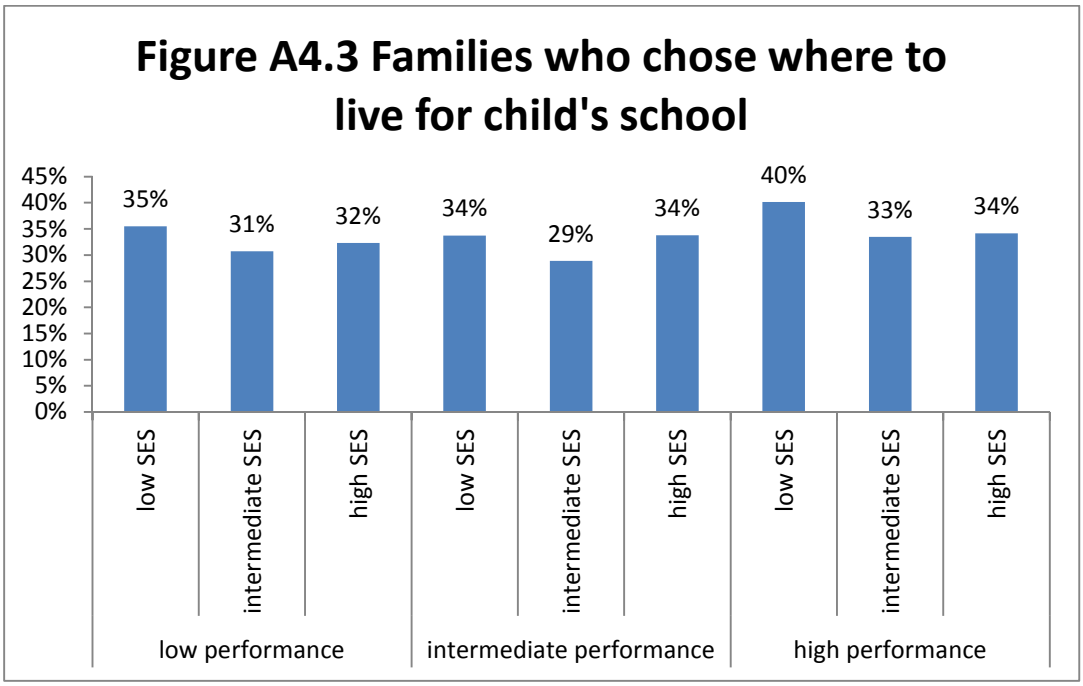
Source: ECLS-K 2011. 95% confidence interval in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Table A4.5: Influence of parents' SES and children's race on monthly learning rates by season.

		(1) Points, beginning of kindergarten	(2) Points gained per month, kindergarten	(3) Points gained per month, summer	(4) Points gained per month, first grade	(5) Contrast: First grade - summer
		b/se	b/se	b/se	b/se	b/se
overall	Parental SES	4.54***	0.04	0.12***	-0.01	-0.13*
		(0.23)	(0.03)	(0.03)	(0.03)	(0.05)
	White	0	0	0	0	0
		(.)	(.)	(.)	(.)	(.)
	Black	-0.46	-0.28***	0.08	-0.17*	-0.24~
		(0.60)	(0.08)	(0.08)	(0.08)	(0.13)
	Hispanic	-1.67***	-0.12*	0.07	-0.19**	-0.25**
		(0.43)	(0.06)	(0.06)	(0.06)	(0.10)
	Asian	2.38***	0.14~	0.33***	-0.46***	-0.78***
		(0.64)	(0.08)	(0.08)	(0.09)	(0.14)
	other	0.21	0.12	0.05	-0.04	-0.08
		(0.64)	(0.08)	(0.08)	(0.09)	(0.14)
	Constant	38.67***	2.12***	1.12***	2.28***	1.16***
		(0.31)	(0.04)	(0.04)	(0.04)	(0.07)
Within schools	Parental SES	4.23***	0.04	0.12***	-0.02	-0.14*
		(0.25)	(0.03)	(0.03)	(0.04)	(0.06)
	Black	-0.76	-0.24**	-0.02	-0.08	-0.05
		(0.67)	(0.09)	(0.09)	(0.09)	(0.15)
	Hispanic	-2.09***	-0.07	0.02	-0.09	-0.11
		(0.50)	(0.07)	(0.07)	(0.07)	(0.11)
	Asian	2.15**	0.18*	0.26**	-0.42***	-0.68***
		(0.69)	(0.09)	(0.09)	(0.10)	(0.15)
	other	0.48	0.13	0.04	-0.05	-0.09
		(0.67)	(0.09)	(0.09)	(0.10)	(0.15)
	Constant	38.83***	2.09***	1.16***	2.24***	1.08***
		(0.28)	(0.04)	(0.04)	(0.04)	(0.06)
Between schools	Parental SES	6.48***	-0.07	0.22**	-0.11	-0.34*
		(0.66)	(0.09)	(0.08)	(0.09)	(0.14)
	Black	2.37	-0.66***	0.53**	-0.52**	-1.05**
		(1.45)	(0.19)	(0.18)	(0.20)	(0.32)
	Hispanic	1.06	-0.38*	0.30*	-0.47**	-0.77**
		(1.11)	(0.15)	(0.14)	(0.15)	(0.24)
	Asian	3.23~	0.02	0.52*	-0.49*	-1.01**
		(1.70)	(0.23)	(0.22)	(0.23)	(0.37)
	other	-2.04	0.10	0.09	0.06	-0.04
		(2.15)	(0.29)	(0.27)	(0.30)	(0.47)
	Constant	37.65***	2.25***	0.98***	2.40***	1.41***
		(0.60)	(0.08)	(0.08)	(0.08)	(0.13)
	Observations	3429	3429	3429	3429	3429

Source: ECLS-K 2011. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

4.8.5 School choices and neighborhood choices



Source: ECLS-K 2011.

4.8.6 Association of mean school SES and students' learning

Table A4.6: Correlation of children's learning rates with the average SES of their schoolmates.

	(1) Points gained per month, kindergarten b/ci95	(2) Points gained per month, summer b/ci95	(3) Points gained per month, first grade b/ci95	(4) Contrast: First grade - summer b/ci95
Parental SES	0.12***	0.06~	0.17***	0.11~
	[0.05,0.19]	[-0.00,0.13]	[0.10,0.24]	[-0.00,0.22]
Reading score at t1	-0.01***	0.01***	-0.03***	-0.05***
	[-0.01,-0.00]	[0.01,0.02]	[-0.04,-0.03]	[-0.06,-0.04]
Parental SES # Reading score at t1	-0.02***	-0.00	-0.02***	-0.02***
	[-0.02,-0.01]	[-0.01,0.00]	[-0.03,-0.02]	[-0.03,-0.01]
Mean school SES	0.09	-0.03	0.20**	0.23*
	[-0.04,0.21]	[-0.16,0.09]	[0.07,0.32]	[0.03,0.43]
Constant	2.08***	1.15***	2.25***	1.10***
	[2.01,2.16]	[1.08,1.22]	[2.18,2.32]	[0.98,1.22]
Observations	3432	3432	3432	3432

Source: ECLS-K 2011. Results controlled for children's sex. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

4.8.7 Compensatory advantage

Table A4.7: Help with homework by children's performance and parents' SES.

	(1) Help with homework b/se	(2) Help with homework b/se	(3) Help with homework b/se	(4) Help with homework b/se
Parental SES	-0.13***		-0.01	-0.12**
	(0.02)		(0.02)	(0.04)
Reading score, beginning of grade 1		-0.02***	-0.02***	-0.02***
		(0.00)	(0.00)	(0.00)
Reading score, beginning of grade 1 # Parental SES				-0.01***
				(0.00)
Constant	3.21***	2.78***	2.79***	2.83***
	(0.02)	(0.03)	(0.04)	(0.04)
Observations	11015	11015	11015	11015

Source: ECLS-K 2011. Note: reading scores at the beginning of grade 1 are mean centered. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table A4.8: Private tutoring in grade 1 (% of children) by children's performance and parents' SES.

	(1) Private tutoring (% of children) b/se	(2) Private tutoring (% of children) b/se	(3) Private tutoring (% of children) b/se	(4) Private tutoring (% of children) b/se
Parental SES	-0.01~		0.01**	0.03***
	(0.00)		(0.00)	(0.01)
Reading score, beginning of grade 1		-0.00***	-0.00***	-0.00***
		(0.00)	(0.00)	(0.00)
Reading score, beginning of grade 1 # Parental SES				0.00*
				(0.00)
Constant	0.13***	0.06***	0.05***	0.04***
	(0.00)	(0.01)	(0.01)	(0.01)
Observations	11011	11011	11011	11011

Source: ECLS-K 2011. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Table A4.9: Association of parents' help with homework with monthly learning rates by season.

	(1) Points gained per month, kindergarten b/se	(2) Points gained per month, summer b/se	(3) Points gained per month, first grade b/se	(4) Contrast: First grade - summer b/se
SES	0.16***	0.08*	0.29***	0.21***
	(0.04)	(0.04)	(0.04)	(0.06)
Help with homework	-0.06***	-0.07***	0.03~	0.10***
	(0.02)	(0.02)	(0.02)	(0.03)
Reading score at t1	-0.01*	0.01***	-0.04***	-0.05***
	(0.00)	(0.00)	(0.00)	(0.00)
Parental SES#Reading score at t1	-0.02***	-0.00	-0.03***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.01)
Constant	2.33***	1.38***	2.15***	0.77***
	(0.08)	(0.08)	(0.07)	(0.12)
Observations	3178	3178	3178	3178

Source: ECLS-K 2011. Results controlled for children's sex. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table A4.10: Does influence of parents' help with homework on monthly learning rates by season vary by earlier performance?

	(1) Points gained per month, kindergarten b/se	(2) Points gained per month, summer b/se	(3) Points gained per month, first grade b/se	(4) Contrast: First grade - summer b/se
SES	0.16***	0.08*	0.29***	0.21***
	(0.04)	(0.04)	(0.04)	(0.06)
Help with homework	-0.06***	-0.07***	0.03~	0.10***
	(0.02)	(0.02)	(0.02)	(0.03)
Reading score at t1	-0.01	0.01*	-0.05***	-0.06***
	(0.01)	(0.01)	(0.01)	(0.01)
SES # Reading score at t1	-0.02***	-0.00	-0.03***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.01)
Help with homework# Reading score at t1	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	2.33***	1.38***	2.16***	0.78***
	(0.08)	(0.08)	(0.07)	(0.12)
Observations	3178	3178	3178	3178

Source: ECLS-K 2011. Results controlled for children's sex. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table A4.11: Correlation of children's learning rates with whether they are tutored regularly.

	(2) Points gained per month, kindergarten b/ci95	(3) Points gained per month, summer b/ci95	(4) Points gained per month, first grade b/ci95	(5) Contrast: First grade - summer b/ci95
Parental SES	0.15***	0.07*	0.24***	0.17**
	[0.09,0.21]	[0.00,0.13]	[0.17,0.30]	[0.06,0.27]
Reading score at t1	-0.01***	0.01***	-0.04***	-0.05***
	[-0.01,-0.00]	[0.01,0.02]	[-0.04,-0.03]	[-0.06,-0.04]
SES# Reading score at t1	-0.02***	-0.00	-0.02***	-0.02***
	[-0.02,-0.01]	[-0.01,0.00]	[-0.03,-0.02]	[-0.03,-0.01]
child tutored regularly	-0.25***	-0.22***	-0.06	0.17
	[-0.38,-0.12]	[-0.35,-0.10]	[-0.19,0.08]	[-0.04,0.38]
Constant	2.10***	1.18***	2.25***	1.07***
	[2.03,2.18]	[1.10,1.25]	[2.18,2.33]	[0.95,1.20]
Observations	2945	2945	2945	2945

Source: ECLS-K 2011. Results controlled for children's sex. 95% confidence intervals in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table A4.12: Hours watching TV per day.

	(1) During a typical week of the summer holidays b/ci95	(2) During a typical week in first grade b/ci95	(3) Contrast: First grade - summer b/ci95
Parental SES	-0.56***	-0.34***	0.04
	[-0.66,-0.45]	[-0.43,-0.24]	[-0.04,0.12]
Reading score at t1	0.01	-0.00	-0.00
	[-0.00,0.01]	[-0.01,0.00]	[-0.01,0.00]
Reading score at t1 # Parental SES	-0.01**	0.01**	0.01*
	[-0.02,-0.00]	[0.00,0.02]	[0.00,0.02]
Constant	3.32***	2.23***	-0.76***
	[3.21,3.43]	[2.14,2.33]	[-0.84,-0.68]
Observations	3460	3170	2945

Source: ECLS-K 2011. Results controlled for children's sex. 95% confidence interval in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table A4.13: Frequency of reading books to child during a typical week of summer and first grade by parents' SES and early performance.

	(1) During a typical week of the summer holidays b/se	(2) During a typical week in first grade b/se	(3) Contrast: First grade - summer b/se
Reading score at t1	0.00	-0.02***	-0.03***
	(0.00)	(0.00)	(0.00)
Parental SES	0.60***	0.54***	-0.06
	(0.05)	(0.05)	(0.06)
SES # Reading score at t1	-0.01~	-0.00	0.01
	(0.00)	(0.00)	(0.01)
Constant	4.81***	4.19***	-0.62***
	(0.05)	(0.06)	(0.06)
Observations	3552	3552	3552

Source: ECLS-K 2011. Results controlled for children's sex. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001. t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

4.8.8 What do children do during the summer?

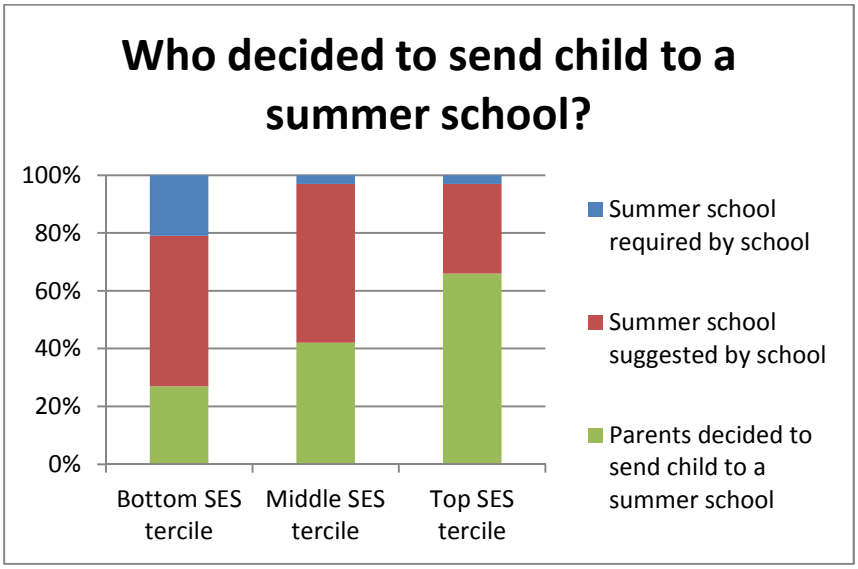
While most children stayed with their parents most of the time, what they do in addition varies strongly with parents' SES. Whereas about 44 % of the children in the highest SES tercile went to a day or overnight **summer camp**, only 7% in the lowest SES tercile did. In addition to the strong positive SES effect, there is a small positive effect of performance, meaning that higher performing children are more likely to attend a summer camp even when controlling for socioeconomic background. The effect of parents' SES is not different for high- and low-performing children. The same is true for day care. About 20% of the children in the lowest SES tercile receive **day care** during the summer, while in the middle and upper SES tercile, about 30% of the children receive day care. The majority of low-SES and minority children receive day care from relatives. Thus, summer camps and day care contribute to explaining the growing inequalities among children with varying SES and to a lesser extent with varying performance levels in summer.

Contrary to the idea that schools have no effect in summer, schools reach into the summer holidays: About 30% of the children got **summer reading lists** from their school. These lists include books children are supposed to read over the summer. Whereas about 24% of the children from the lowest SES tercile get summer book lists from their school, about 32% of the children in the upper SES-tercile get them. Thus, summer reading lists do not counteract SES differences in summer learning but reinforce inequalities.

Whereas schools do not use their potential to influence summer learning for low-SES children by giving them summer book lists, they do by suggesting children to attend a **summer school**. Attending a summer school is not associated with parental socioeconomic background. About 15% of the children in the lowest performance tercile attend a summer school, while only 5% in the highest performance tercile do. Thus, summer schools for children aged 5 or 6 are mainly remedial summer schools and not enriching summer schools.

Do families or schools suggest sending the child to a summer school? Whereas attending a summer school is not associated with parents' SES, who decided to send the child to a summer school is strongly associated with socioeconomic background. In the lowest SES tercile, among those whose children attend a summer school, only 27% of the parents decided to send their child there, whereas in the highest-SES terciles 66% of the parents decided to send their child to a summer school (figure A4). 20% of the children in summer schools from the lowest SES tercile were required to attend a summer school, but only 3% from the highest SES terciles were required to attend a summer school. To sum up, different mechanisms for high- and low-SES children lead to a similar attendance rate. This way, schools compensate for the lower propensity for low-SES parents to send their child to a summer school to a degree that there are no SES differences in attending a summer camp.

Figure A4.4: Distribution of the decision to send the child to a summer school by parent‘s SES.



Source: ECLS-K 2011.

5. Why you should move to Finland to live the American Dream: Cognitive inequalities in learning during the summer and the school year in the United States and Finland

Abstract

From a policy perspective, it is important to know whether schools can compensate for unequal family conditions or whether addressing socioeconomic inequalities between families would be a more effective policy for combatting educational inequality. I contribute to this debate by presenting the findings of a comparative analysis of data from studies conducted in the United States and Finland. The PISA studies have shown that students in Finland perform well in tests in comparison to students in other countries. By contrast, students in the United States do not perform as well, and this result is largely attributed to the lower test scores of students from disadvantaged families. This finding raises the question of whether Finnish students from low socioeconomic backgrounds perform well because child poverty in Finland is low or because of the country's egalitarian education system. To answer this question, I compared children's learning during the school year, which is shaped by school as well as non-school factors with learning during the summer break when learning is shaped solely by non-school influences. My analysis of data from the ECLS-K: 1999 study conducted in the United States and from the Jyväskylä Entrance into Primary Schools Study in Finland covered children's reading and mathematics performance in kindergarten, in the summer after kindergarten, and in grade 1. The findings indicated that learning during the summer holidays was not influenced by parents' education in Finland, whereas in the United States, gaps between children from different family backgrounds widened during the summer. As summer learning is influenced by non-school factors alone, this suggests that a lower degree of socioeconomic inequality between families contributes to a high level of educational equality. In addition, whereas students in Finland whose parents had low education levels caught up during the school year, this was not the case in the United States. This finding suggests that contrasting with schools in the United States, schools in Finland play an equalizing role in relation to reading performance.

5.1 Research question

When the results of the first international PISA study were published, those of a small northern European country, Finland, surprised the world. Finland not only distinguished itself by achieving the highest mean performance, but it also demonstrated a high level of equality

of opportunity.[8] By contrast, in the United States, students' performance was at best average and the influence of family background was strong. In particular, students from disadvantaged families scored higher in Finland than they did in the United States. Thus, Finland has evidently succeeded in providing students from disadvantaged families with educational opportunities, which is actually an important component of the "American Dream." This prompted Kristof (2014) to write in the *New York Times* that "The American dream is leaving America."

Lower educational opportunities for disadvantaged students in the United States are not the price to pay for educational excellence at the top. Despite having prestigious private high schools, the United States had a lower share of high-performing students compared with Finland in the PISA studies. Although the number of high performers in Finland has shrunk over the years, the high-share of high-performing students in this country challenges the view that high-achieving students who attend comprehensive schools do not achieve their educational potential. The Finnish results in PISA show that there is no trade-off between equality of opportunity and excellence in education. Consequently, Fleetwood (2013) suggests: "If you want the American Dream, go to Finland."

Finland's success and that of Canada, South Korea, and Singapore in the PISA study has prompted a burgeoning literature on the education systems of these countries (Darling-Hammond, 2010; OECD, 2011). The title of Sahlberg's book, *Finnish Lessons: What the world can learn from educational change in Finland*, published in 2015, suggests that these countries' education systems can serve as models for other countries to learn from. For example, Finland stands out for having a strongly egalitarian education system with very low levels of inequality between schools (OECD, 2011; Sahlberg, 2015). Finnish children of all backgrounds learn together until the age of 16 years. In addition, Finnish comprehensive schools are much more inclusive than most comprehensive schools in the United States, where residential segregation leads to socioeconomic segregation of schools and students are differentiated into groups of varying abilities. In fact, the United States has one of the most socioeconomically segregated education systems of all of the countries assessed in the PISA. Thus, Finland presents an interesting case that demonstrates how all students within heterogeneous schools can be supported, thereby combining a high competence level with high educational opportunity.

The United States reacted to the shocking PISA finding by implementing education reforms that served to reinforce student testing and competition between schools. However, as the reforms brought no improvements over the next decade of PISA studies, critics asserted that families and not the school system were the underlying cause of the problem (Berliner, 2013; Condron, 2013; Merry, 2013). Berliner argues that the "design of better economic and social policies can do more to improve our schools than continued work on educational policy independent of such concerns" (Berliner, 2013, p. 1). Similarly, Merry (2013) suggests that "perhaps some countries do well not so much because their education systems are excellent, but because they have low poverty rates, generous welfare systems, and high-quality early

[8] Apart from some English-speaking countries like Canada, some of the Asian countries also demonstrate that a high competence level can be combined with a high level of educational opportunity.

child care" (Merry, 2013, p. 4). Socioeconomic inequalities between families are much lower in Finland compared with these inequalities the United States. In addition, child poverty rates in Finland are low. Whereas only 4% of Finnish children grow up in poor households, 21% of children in the United States grow up in such disadvantaged conditions (OECD, 2009). Moreover, even though many adults in both countries have attended university, the proportion of adults lacking basic competencies in mathematics and reading is higher in the United States (OECD, 2013a). Further, whereas Finland has a low immigration rate, the United States is a diverse country in terms of race and migration. Thus, the question that I attempted to answer was whether students from disadvantaged families in Finland perform well because poverty and immigration rates in Finland are low or because students from disadvantaged families receive substantial support within the egalitarian Finnish education system. Thus, I sought to answer the question arising from the title of Fleetwood's (2013) book: *Why* is it that if you want to live the American Dream, you should move to Finland? Is this because disadvantaged families provide better opportunities for children in Finland than in the United States, or is this because the egalitarian Finnish school system provides opportunities for all children regardless of their socioeconomic origins?

In the following sections of this chapter, I first discuss the literature on the role of schools versus the role of families to explain country-wise differences relating to educational opportunity. Next, I explain my research design and introduce the datasets. In the fifth section, I briefly outline the school systems in Finland and the United States. In the sixth section, I present the results of my analysis, and in the final section, I discuss the results and present my conclusions.

5.2 Theoretical mechanisms, empirical findings, and methodological problems in the literature

5.2.1 The role of schools and education systems

The results of international student assessments have prompted many researchers to look at differences in education systems that could explain why some countries outperform others in relation to cognitive tests. As the Finnish advantage over the United States is especially pronounced among low-performing and low-SES students, the focus of the present study is on how education systems influence schools in ways that either amplify disparities between high- and low-SES students or do so to a lesser degree or not at all.

Even though the United States and Finland both have comprehensive education systems, inequalities between schools in the United States are substantial, whereas Finnish schools demonstrate a high level of equality in terms of intakes and resources (OECD, 2010a). Therefore, it is not *formal* differentiation of schools into different types that reinforces cognitive inequalities in the United States, leading to significant inequalities between schools; rather, more "hidden" mechanisms are at work. In fact, schools in the United States are highly segregated in terms of students' socioeconomic backgrounds. The mechanisms that create segregation between schools in the United States are the high level of residential segregation

by wealth and race and the market-based approach to school choices and accountability (Lareau & Goyette, 2014). Of the school systems assessed in the PISA study, Finnish schools demonstrated the least disparity in terms of ability or SES composition (OECD, 2010a). Children from different socioeconomic backgrounds and with different abilities thus attend the same schools in Finland.

Segregation of students based on their ability and socioeconomic background can lead to the creation of disadvantageous schools, not only in terms of peers, but also in terms of the quality of instruction and resources. This effect may be especially strong in the United States where schools are financed partly by local taxes, which means that schools in poorer areas have fewer resources (Arroyo, 2008). In general, schools with many students who are perceived to be difficult have problems attracting good teachers (Gamoran & Berends, 1987) and in the US context, they also have less money to do so. The US education reforms, following the PISA results, have served to reinforce testing and competition between schools. Consequently, they have resulted in greater inequality between schools and diminishing resources allocated to "bad" schools and have supported parents' freedom of choice in school selection.

By contrast, the funding of schools in Finland is based on the number of students, and schools may receive additional funds if they serve many immigrants or students from economically disadvantaged backgrounds. In addition, Finnish teachers are consistently chosen from among the best high school graduates, as teaching is one of the most popular professions in Finland. In a survey, Finns rated teachers' social standing at the same level as that of medical doctors, lawyers, and professors (OECD 2011). Consequently, competition for places on training courses is stiff, and there are enough excellent teachers to cover the needs of all schools across the country (OECD, 2011).

In general, parents with high educational aspirations try to avoid selecting schools that have problems attracting good teachers. This leads to a further concentration of disadvantaged students in these schools. Social capital theory predicts that students from disadvantaged backgrounds will benefit from socioeconomically mixed schools where they interact with students with high educational aspirations. When their schoolmates perform well, students often feel challenged to improve. In addition, they could develop higher educational aspirations. Further, a school's student body composition influences the quality of instruction by shaping teachers' expectations. In schools with more students from disadvantaged families and those with seemingly lower ability, teachers' expectations of the students tend to be low If, however, teachers view the majority of their students as highly receptive to learning, their standards will be high. Students will then internalize these standards, thus conforming to their teachers' expectations (Rosenthal & Jacobson, 1968).

US students from disadvantaged families tend to attend schools that are disadvantaged in terms of teachers, quality of instruction, and peers. They are therefore trapped into attending disadvantageous schools (Bifulco, Ladd, & Ross, 2008; Gamoran & Berends, 1987; Oakes, 1985). By contrast, disadvantaged students in Finland attend the same schools as all other students, indicating that schools provide them with equal educational opportunities. In addition, Finland's comprehensive support system for children with special needs is widely

lauded. If students have problems, interdisciplinary teams of teachers, social workers, health workers, and psychologists work together to provide them with support. Thus, in addition to low inequality between schools in Finland, there are efforts to support students within heterogeneous schools. To sum up, Finland's teachers are all recruited from among the top graduates. Moreover, Finland has highly equal schools in terms of student composition, and special support is provided to students with learning difficulties. By contrast, in the United States, schools are highly unequal in terms of student composition, teacher quality, and financial resources.

The findings of longitudinal studies support the view that disadvantaged students in the United States fall further behind their peers because they attend disadvantaged schools. Aikens and Barbarin (2008) found that the development of cognitive gaps attributed to socioeconomic background is related more to inequalities between schools than to inequalities between families in the United States. By contrast, cognitive inequalities in Finland increase in kindergarten but decline once children enter school (Parrila, Aunola, Esko, Nurmi, & Kirby, 2005 Nurmi, & Kirby, 2005).

The view that Finland's high performance is not solely attributable to low levels of socioeconomic equality between families, but is also attributable to its education system is supported by the literature evaluating the comprehensive school reform implemented in Finland. In the 1970s, educational tracking of children was postponed from the age of 10 years to the age of 15 years. According to Kerr et al. (2013), this reform has led to improved cognitive test scores among students whose parents only have a basic education. This finding indicates that disadvantaged students perform relatively well in Finland not only because of the better socioeconomic conditions in their families compared with those of students elsewhere, but also because of the Finnish education system.

5.2.2 Family conditions and socioeconomic inequality

As previously discussed, several arguments have been propounded to explain why the US education system contributes to larger SES achievement gaps than those existing within the Finnish education system. However, several researchers have contended that performance improvements among disadvantaged students in the United States do not just require school reforms; they also require an amelioration of constraining socioeconomic conditions within these students' families (Berliner, 2013; Boyd-Zaharias & Pate-Bain, 2008).

5.2.2.1 Methodological challenges

Analyzing the reasons for a country's high performance in international student assessments is a challenging task for researchers, because students' learning is shaped by both families and schools. Jack Buckley, a US commissioner at the National Center for Education, expresses this problem as follows: "I never expect tests like these to tell us what works in education. That's like taking a thermometer to explain why it's cold outside" (cited in Layton (2013)). To compare different education systems, the respective influences of families and schools on

the development of young people need to be separated. This is not an easy task, as more highly educated or wealthy parents are better able to support their children and to help them with homework compared with parents who are not as highly educated or wealthy. These parents also usually send their children to better schools than the latter. If a child performs well in a test, it is therefore not clear whether this is due to support received from family members, a good school, or both. The same holds for different education systems. If the students in a particular country perform well in the PISA study, it is unclear whether this is due to the education system or to high levels of support available to children within their families. I first discuss the attempts within the literature to take families into account and then present my own approach.

5.2.2.2 Controlling for socioeconomic inequality

Condron (2011, 2013) argues that explanations for the low performance of US students in international educational assessments are too focused on differences in education systems, thereby losing sight of the fact that among the developed countries, the United States evidences the highest levels of socioeconomic disparities (Pontusson, 2005; Smeeding, Erikson, & Jäntti, 2011). Using PISA data from 2006, Condron (2011) shows that countries with lower levels of socioeconomic disparities tend to demonstrate a higher average performance, a greater number of students at the highest competence levels, and a lower number of students with very low competences. He predicts that the United States would outperform Finland if its level of income inequality was similar to that of Finland.

Thus, one way of accounting for Finland's low level of socioeconomic inequality (and the fact that it has few children from migrant families) is to control for these factors. However, this approach is crude, as countries with the same level of income inequality demonstrate very different levels of performance. For example, although Sweden and Norway are Scandinavian countries with low Gini coefficients, they do not perform as well as Finland in the PISA studies. In addition, this methodological approach does not consider the institutions involved. A poor student in Finland may still have better educational opportunities than a poor student in the United States, as he or she will live in a more favorable neighborhood and attend a better school than the latter.

5.2.2.3 Tracing the poor performance of the United States in PISA to early childhood

Like Condron, Merry (2013) claims that the United States lags behind in the PISA study not because of its education system, but because children in the United States face poorer socioeconomic conditions. He supports his claim by comparing the test score gap between American and Canadian children in early childhood and at the age of 15 years. A finding that American children fall behind their Canadian peers over the course of their schooling would support the view that US schools are performing less well than schools in Canada. If, however, it is established that the gap already exists before children enter schools, this would

indicate that children in the United States face poorer socioeconomic conditions. Merry finds that the substantial gap in reading scores in PISA can be traced back to early childhood before schools have had any influence.

However, an examination of the PIRLS data reveals that there is some evidence contradicting Merry's argument. Canadian fourth graders performed worse than their American counterparts in the PIRLS conducted in 2011 (Mullis, Martin, Foy, & Drucker, 2012), indicating that the Canadian advantage at the age of 15 develops during their time in school and may not be only related to family conditions. One reason why Merry may have overestimated the degree to which the American disadvantage already exists at an early age is that the data source he uses for the United States– the National Longitudinal Study of Youth (NLSY79) - is based on a sample of children born to young, disadvantaged mothers (Wu & Li, 2005).

I am not aware of any comparable data that would enable the disparity in the PISA results for the United States and Finland to be traced back to early childhood prior to school entry. However, it is possible to trace the gap back to the end of elementary school using the PIRLS and TIMSS data. Finnish students were found to be already performing better than American students in reading by the end of elementary school (Mullis et al., 2012). The higher scores for Finland in the PISA study indicate that the Finnish advantage grows as children get older, given that the PISA study measures the competences of 15-year-old students. However, the PIRLS and PISA study do not use the same measures. Whereas both assessments measure literacy, the PIRLS measures curriculum-related competencies, while the PISA employs a concept that is applicable to everyday situations. Nor are they scaled in the same way. In addition, there is no available data for Finland that enable a comparison between the same cohort in grade 4 and at the end of lower secondary school. As Finland's performance has declined over time, the growth of the Finnish advantage from primary to secondary education may therefore have been underestimated.

In the TIMMS, which measures curriculum-related mathematical skills in both fourth grade and eighth grade students, the performance of Finnish and American students was similar. Moreover, excluding the fact that the tests were not administered to the same cohort, differences did not seem to increase from the fourth to the eighth grades. By contrast, the performance of American 15-year-olds in the PISA's mathematics assessments was evidently worse than that of their Finnish peers (although the difference declined with successive cohorts). What is clear is that Finnish students at the lower end of the competence distribution performed better than their American peers in all of the studies, whereas the difference at the top of the performance distribution was smaller. Unfortunately, questionnaires for parents were not administered in the United States for the PIRLS. Consequently, it is not clear how family background influenced the results. Nonetheless, the results of the PISA studies clearly indicate that the disparity between Finland and the United States largely centers on students from disadvantaged families.

5.2.2.4 Seasonal comparisons as a way of assessing the impact of schooling on inequality

A third way of analyzing how families and schools influence students' learning is to compare learning during the school year when school is in session with learning during the summer when schools are closed (Heyns, 1978). Heyns (1978), Alexander et al. (2001), and Downey et al. (2004) found that gaps between children from different socioeconomic backgrounds increased during the summer holidays. By contrast, these different groups of children developed largely in parallel with each other during the school year. Thus, cognitive inequalities grew less during the school year than they might have done without the influence of schools.

The literature on the summer-learning gap stems from studies conducted in the United States. There are few European studies that have compared summer learning with term-time learning. Contrasting with the US findings, Lindahl (2001) found that that socioeconomic background of Swedish students and those with non-Swedish parents did not influence summer learning in mathematics between grades 5 and 6. As summer learning is shaped mainly by families, and performance gaps increase during that time in the United States but not in Sweden, it seems that families offer children in Sweden more equal learning opportunities than do families in the United States.

During the school year, students with non-Swedish parents learned more than their native peers did. Their socioeconomic backgrounds did not influence learning during that time. Having non-Swedish parents could reflect the need to learn Swedish. As children with a migrant background caught up during the school year but not during the summer, school would appear to be the place where these children learned Swedish. Similar findings have been reported by Verachtert et al. (2009) for the Flemish part of Belgium. However, because of the ceiling effects in their tests, they only included low-achieving students in their analysis. The results indicate that children in Belgium, like those in Sweden, grow up in more equal socioeconomic conditions than they do in the United States.

I anticipated that findings for Finland would be similar to those for Sweden in terms of family conditions. However, Finland has performed better than Sweden in international student assessments, and Finnish students' performance is less related to their socioeconomic status than it is in Sweden. Therefore, schools in Finland may have compensatory effects.

Table 2.1: Overview of the literature on summer learning and school-year learning for different countries

	United States	Sweden	Belgium
Summer	SES-gap: growing	SES-gap: stable; native-migrant gap: stable	SES-gap: stable; native-migrant gap: stable
School year	SES gap: stable	SES gap: stable; Native-migrant gap: declining	SES gap: stable; Migrant gap: declining
Comparison periods	- Final preschool year, summer, and grade 1, United States Downey et al. (2004) - Grades 1–5 and all summers in between, Baltimore Alexander et al. (2007) - Grades 6–7, Atlanta Heyns (1978)	Summer between grades 5 and 6 and grade 6	Last year of kindergarten, summer, and grade 1
Subject	Mathematics and reading	Mathematics	Mathematics
References	Downey, Hippel, Broh (2004); Alexander, Entwisle, Olson (2007); Heyns (1978)	Lindahl (2001)	Verachtert, van Damme, Onghena, and Ghesquiere (2009)

5.3 Research design and hypothesis

I compared school-year learning and summer learning to disentangle schooling and family effects in the United States and Finland. My aim was to address the question of why Finnish students perform well much more independently of their socioeconomic background than do students in the United States. Is this due to the more equal family conditions in Finland or is it due to this country's egalitarian school system? If the former applies, then the learning rates of Finnish students from different socioeconomic backgrounds during the summer would be expected to be more similar than those of students in the United States. Because schools are closed during the summer, more unequal learning rates can be attributed to families. If the egalitarian school system contributes to equalizing the performance of students from different socioeconomic backgrounds in Finland, students from low socioeconomic backgrounds would be expected to catch up during the school year in Finland but not in the United States.

I hypothesized that Finnish children from disadvantaged families benefit both from greater socioeconomic equality and from the egalitarian school system in Finland. I thus expected the following findings. First, children from different family backgrounds in Finland develop more equally during the summer holidays than they do in the United States. This is because learning during the summer mainly reflects family influences, and children in Finland grow up in more equal socioeconomic conditions than do children in the United States. Second, I hypothesized that Finnish children from disadvantaged families catch up during the school year, whereas students in the United States do not. This is because of the different school systems in these countries. Whereas there is very little variation between schools in Finland, schools in the United States are more unequal in terms of their student composition and quality.

5.4 Data and Method

5.4.1 The ECLS-K 1999 study in the United States

The data for the United States were derived from the national ECLS-K 1999 study. Children were followed from kindergarten, through middle school, up to grade 8. For the study, children's skills were tested in two fields: language and literacy and mathematical thinking. They were first tested in the fall and spring terms of kindergarten (1998–1999) and subsequently when they were in grade 1 in the fall and spring (1999–2000). These data enabled me to estimate the children's learning rates during the last year of kindergarten, the summer holidays, and grade 1. However, only one annual test was conducted for subsequent grades: in the spring terms of grade 3 (2002), grade 5 (2004), and grade 8 (2007), respectively. Consequently, it is not possible to separate learning during the summer holidays from learning during the school year for these later grades.

For the four assessment rounds conducted in kindergarten and in grade 1, the same assessment instruments were used. A two-stage design reduced ceiling and floor effects. Students first took a brief "routing test" comprising items that reflected varying degrees of difficulty. The results were used to develop a main test comprising questions reflecting an "appropriate" level of difficulty (NCES, 2002). Questions whose response patterns did not differ between students or those that were easy to guess were down-weighted.

5.4.2 The Jyväskylä Entrance into Primary Schools Study in Finland

The Finnish data were derived from the Jyväskylä Entrance into Primary Schools Study[9] (Parrila et al., 2005). Like the US ECLS-K cohort (and similar to the PISA 2009 cohort), the children in this study were all born around 1993. This study entailed a few problematic issues that should be noted at the outset. The sample size was very small, comprising only around 200 students and did not constitute a representative sample of the Finnish population. A total

[9] Special thanks are owed to Kaisa Aunola, who translated the data set to English and answered all my questions on the study.

of 197 children from two medium-sized municipalities in Central Finland were followed from preschool until the age of 17 years. They were sampled from 21 preschool groups and 17 classrooms in 13 schools. Consistent with the low overall immigration rate to Finland, the sample included only children whose native language was Finnish. Even though the sample was not drawn as a random sample from the entire population, the children in it did not differ significantly from the wider population in terms of education and social class (Leppänen et al., 2004). Within the sample, 16% of the fathers had a university education compared with 15% of Finnish men aged 30–44 years in 1999, and 17% of the mothers in the sample had a university degree compared with 16% of women aged 30–44 (Statistics Finland, 2012). Thus, the educational profiles of individuals within the sample were very similar to those in the general Finnish population. As in the case of several other studies on summer learning and school-year learning, I therefore accepted the drawback of having a small non-random sample in exchange for the opportunity to use longitudinal data that enabled me to separate summer learning and school-year learning.

5.4.3 Reading and mathematics assessments

Students' test scores in Finland and the United States cannot be compared directly because of differences in the tests. Consequently, it was not possible to judge whether on school entry, children are more advanced in reading in Finland or in the United States. It was also not possible to determine whether children learned more in school in one country or the other. This was a drawback of my approach in comparison to internationally comparative studies. Nevertheless, reading tests conducted in both countries were aimed at assessing very similar concepts and skill dimensions. The Finnish reading test assessed word recognition, reading fluency, and reading comprehension (Leppänen et al., 2004). The reading test in the United States assessed recognition of letters and words, reading fluency, vocabulary, and reading comprehension (NCES, 2002). Thus, although the tests used in these two countries were not the same, they were both designed to measure similar competencies.

Even though the scores could not be directly compared, the advantage of the data for my study was that I was able to follow children's development over time. Within each country, it was possible to compare progress during the summer to progress during the school year, as scores were measured on the same scale over time. To make the scores more comparable and their interpretation more straightforward, I standardized the data in a way that the mean for the first measurement as well as the amount that children learned in grade 1 corresponeded to 10. By doing so, I allowed the mean and the variance to change over time, which was important for the research question. Instead of directly comparing the scores between countries, I focused on the question of whether inequality in reading scores increased or declined and whether this differed between the two countries.

In none of the tests were children's scores clustered at the highest or the lowest values of the test. Thus, there were no strong ceiling or floor effects.

5.4.4 Summer learning and school-year learning

It is possible to compare summer learning and school-year learning in Finland and the United States, because summer holidays in both countries are about 10 weeks long. In each of these countries, children were tested around the beginning of their final preschool year; around 1.5 months before the onset of the summer holidays; around 1.5 months after the summer holidays began, when the children entered grade 1; and around the end of grade 1. Therefore, their learning rates during the final preschool year, during the summer holidays, before entering school, and during grade 1 could be analyzed. In both countries, however, "summer learning" did not measure learning solely during the summer holidays; it included 1.5 months of school-year learning before and after the commencement of the holidays. If, as previous studies from the United States suggest, schools do in fact equalize learning, then the effect of schools would have been underestimated. Downey et al. (2004), who work with the same dataset for the United States, took that into account by including the number of days that each child spent in preschool, during summer holidays, and in grade 1. However, because this was not possible with the Finnish data, and because my aim was to ensure that the data were as comparable as possible, I did not do the same.

To account for the fact that the duration between the measures in summer was shorter than it was during the school year, I calculated monthly learning rates. Thus, I divided learning rates by the number of months between the measurements. In the case of the ECLS-K study, there were about six months in preschool, five months in summer, and seven months in grade 1. The time periods in the Finnish JEPS study were very similar. The only exception was that the period between the preschool measurements was seven months (compared with six months in the ECLS-K study).

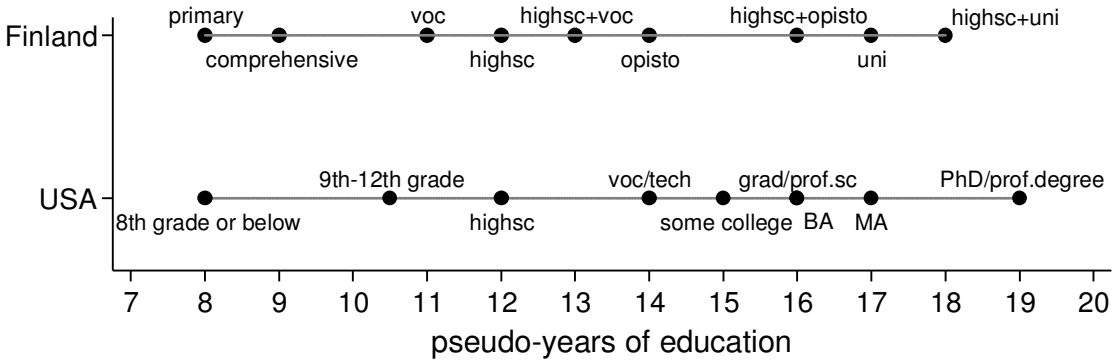
5.4.5 Family background

The literature on summer learning losses tends to use SES as a measure of family background. However, I did not have a comparable measure for the Finnish dataset. Therefore, I relied on education as a measure of family background. Education is related to income and occupational prestige. For example, 1.6% of children with at least one parent with some college or additional education live in poor families in Finland, whereas the comparable percentage in the United States is 6.7%. By contrast, the percentages of children whose parents have less than a high school diploma living in poor families in Finland and in the United States are 6% and 51.4%, respectively (Gornick & Jäntti, 2010). Another advantage of using parents' education rather than SES as a measure is that the former has fewer missing values.

The information on education was obtained from the parents' questionnaires. I used the highest level of education reported by either of the parents at either of the time points. In cases of missing values, I used information obtained from the other parent or another time

point if possible. To make the information comparable across countries, I transformed parents' information on their educational level into pseudo education (Figure 5.1). This indicator may fit the linear US education system better than it fits the Finnish education system, which offers more vocational options. To take this factor into account, I conducted extensive robustness checks applying different specifications of parents' education and SES.

Figure 5.1: Transformation of the education categories into pseudo years of education in Finland and the United States



5.4.6 Sample, missing values, and technical details

To estimate the impacts of schooling, I excluded children attending year-round schools (n = 71 in the United States) or those who repeated kindergarten (n = 132 in the United States and none in Finland). Parents' education was missing for 4.3% of the students in Finland and 4.2% of those in the United States. A slightly larger number of students with lower education levels in the United States had missing values for the performance measures, whereas in Finland the effect was positive but close to zero. This difference in attrition would have led to an underestimation of country differences, because more disadvantaged students in the United States dropped out of the study. The estimates of country differences were thus conservative. I weighted the ECLS-K data with the recommended panel weight. As my independent variables had few missing values, the results did not change when using multiple imputations. Here, I report results without using multiple imputations. The results only changed with the use of SES, which has many missing values, and not when using parents' education as I did.

5.5 The US and Finnish preschool and elementary school system

In Finland and in the United States, children's progress was followed within the respective studies during their final preschool year, the summer, and during grade 1. In Finland, children enter preschool in the year of their sixth birthday, whereas in the United States they enter preschool about one year earlier. Therefore, the American children in the study were about one year younger than their Finnish peers. Preschool is not compulsory in either country, but is nevertheless attended by almost all children. In the Finnish preschools, there is "no formal teaching of basic academic skills, but children are encouraged to play with language and

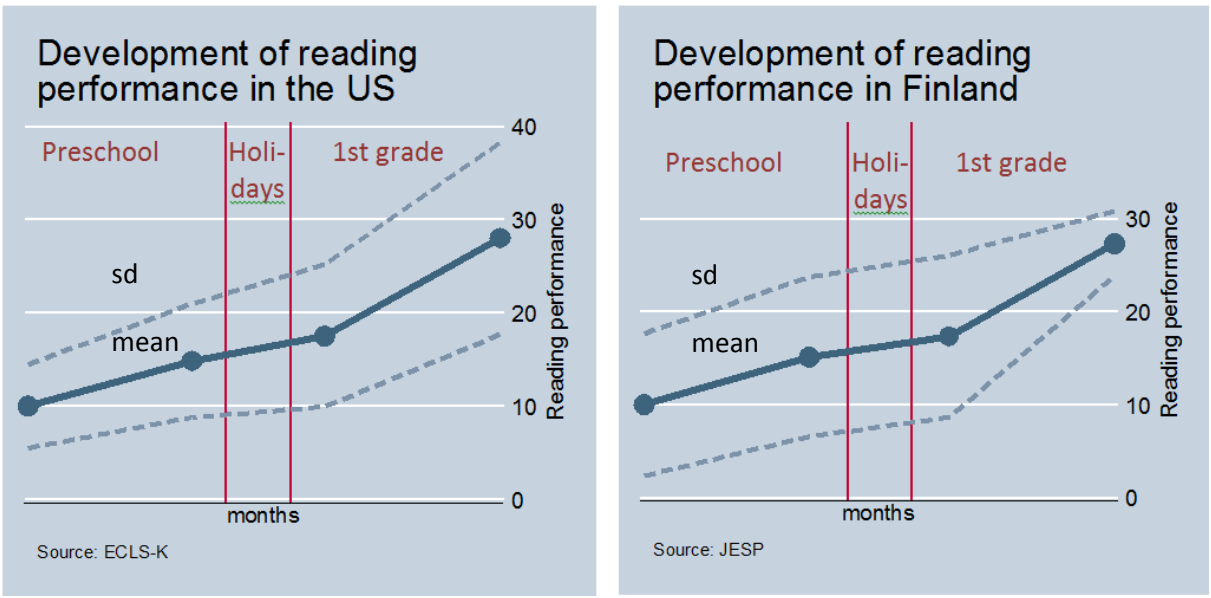
numbers" (Leppänen et al., 2004, p. 77). In the United States, children learn to read and write in preschool. Elementary school, including formal teaching, begins in the year that children turn 7 in Finland and 6 in the United States. The duration of summer holidays in both Finland and in the United States is approximately 10 weeks.

5.6 Results

5.6.1 Achievement gaps during the summer and the school year

Whether children grow up in Finland or in the United States, their improvement in reading and mathematics occurs at a much faster pace when schools or preschools are in session than during the summer. This is evident in Figure 5.2, which shows that learning rates were steeper during grade 1 and preschool and were lower during the summer break. This pattern indicates that schools and (to a lesser extent) preschools are successful in accelerating the learning rate. The pattern simultaneously confirms the effectiveness of the research design, because children learn less during the summer than they do when schools are closed for about three months in both countries. In Finland and in the United States, children gained about 3 to 4 times more points per month on the reading test during the school year than they did during the summer. Moreover, this is a lower bound estimate, as children were tested about 1.5 months before and 1.5 months after the summer break. Learning rates in the summer therefore not only reflected learning during the summer break, but they also reflected the influence of some months of schooling. To sum up, even though Finland and the United States are very different countries with different family and school conditions, the average pattern associated with learning in relation to reading and mathematics in preschool, during the summer break, and in grade 1 was quite similar in the two countries.

Figure 5.2: Development of reading performance by season in the United States and Finland



Though general trends were similar in the two countries, inequalities in test scores developed differently. This can be seen in Figure 5.2. Whereas the average pattern (depicted as a continuous line) was similar for both countries, the standard deviation of the test scores followed different pathways (the dotted lines). That is to say, inequality in reading test scores evidently increased over time in the United States, whereas it shrank in Finland. Thus, while children's reading skills diverged over time in the United States, they converged in Finland. This is also evident in Tables 5.2 and 5.3, which show the relationship between reading scores at the beginning of the final preschool year and learning rates during preschool, the summer holidays and in grade 1. In the United States, the correlation was positive for all three time periods, indicating that initial inequalities in reading scores expanded over time. In Finland, however, the correlation was negative for all three time periods, indicating that initial inequalities decreased over time.

Were these opposing trends caused by greater inequalities existing between families or those existing between schools in the United States? As schools are closed during the summer months, a comparison of learning rates during the summer holidays provides an indication of the role of non-school influences on children's learning in the two countries. In the United States, inequalities in reading scores were found to be exacerbated in the summer, whereas in Finland they remained relatively constant or even showed a slight decline. This finding is evident in Table 5.2, which shows a positive correlation between initial reading scores with learning rates during the summer in the United States, whereas the correlation is slightly negative in Finland (Table 5.3). During the summer holidays, initial inequalities in the United States increased by 4%, whereas they decreased by 1% in Finland. This finding supports the claim that the inequality in test scores was higher in the United States than in Finland, because inequality in relation to learning opportunities provided by families is greater in the former country.

In addition to families, schools seem to play a role in explaining the lower level of inequality in reading scores in Finland compared with those in the United States. The effect of schools over and above the effect of families can be estimated by comparing learning rates during the summer when schools are closed, with learning rates during the school year. Model 4, shown in Tables 5.2 and 5.3, reveals the difference between learning that occurred during term time and learning that occurred during the summer holidays. In both Finland and the United States, schooling equalized students' performance. However, this effect was found to be much stronger in Finland than in the United States, as Figure 5.2 clearly depicts. In the United States, initial inequalities increased by 2% during the school year as opposed to 4% during the summer. In Finland, initial inequalities decreased by 9% during the school year as opposed to 1% during the summer. Thus, the divergence in children's reading scores in the United States would be even greater if there were no schools. The reading skills of Finnish children evened out in grade 1 when systematic instruction was introduced. This is because low-performing children in Finland caught up with their more advanced peers after they entered school. Thus, while it is true to say that schools are an equalizer in the United States, they do not play the role of "the great equalizer" as many had hoped. By comparison, the equalizing effect of schools was found to be much stronger in Finland.

Are schools stronger equalizers in Finland than in the United States because there are greater differences in quality between US schools? If this was the case, reading gaps would be expected to widen between schools in the United States, but not between schools in Finland. At the same time, the effect of schools for children *within* the same school would be expected to be the same in both countries. Consequently the difference between these countries would be primarily attributable to greater inequalities between schools in the United States. To investigate this further, I performed a multilevel regression separating the effect within and between schools. The results are shown in Tables 5.2 and 5.3 Disparities between students attending the same (pre)school did not widen further during the school year in the United States, whereas they did during the summer when schools are closed. Thus, in the United States, the compensatory effect of schools operated within the context of individual schools, meaning that the performance gap between children attending the same school did not widen during the school year. This finding indicates that children attending the same school encounter more equal learning opportunities during grade 1, than during the summer holidays. However, if we compare children from one school with those from another, this does not hold. If anything, inequalities increase between these children, although the effect is not statistically significant. In Finland, students with a lower level of reading skills caught up during grade 1, regardless of the schools they attended. This finding would support the argument that schools in Finland provide similar learning opportunities.

Table 5.2: Correlation of learning rates with initial reading knowledge in the United States

	(1) **Kindergarten**, points gained per month	(2) **Summer holidays,** points gained per month	(3) **Grade 1**, points gained per month	(4) Contrast: Grade 1 - summer
	b/se	b/se	b/se	b/se
Reading scores t1	0.01***	0.04***	0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.66***	0.06*	1.37***	1.29***
	(0.03)	(0.03)	(0.04)	(0.05)
Within schools:	0.01***	0.04***	0.01***	-0.03***
Reading scores t1	(0.00)	(0.00)	(0.00)	(0.00)
Constant	0.69***	0.08**	1.43***	1.35***
	(0.03)	(0.03)	(0.04)	(0.05)
Between schools:	0.04***	0.06***	0.08***	0.02
Reading scores t1	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.38***	-0.08	0.77***	0.86***
	(0.07)	(0.07)	(0.11)	(0.13)
Observations	3,531	3,531	3,531	3,531

Source: ECLS-K 1999. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.
t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

Table 5.3: Correlation of learning rates with initial reading knowledge in Finland

	(1) **Kindergarten**, points gained per month	(2) **Summer holidays,** points gained per month	(3) **Grade 1**, points gained per month	(4) Contrast: Grade1 - summer
	b/se	b/se	b/se	b/se
Reading scores t1	-0.01	-0.01*	-0.09***	-0.08***
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.88***	0.53***	2.44***	1.90***
	(0.10)	(0.07)	(0.10)	(0.14)
Within schools:	-0.01	-0.01*	-0.10***	-0.08***
Reading scores t1	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.87***	0.55***	2.49***	1.94***
	(0.09)	(0.07)	(0.10)	(0.15)
Between schools:	-0.03	0.00	-0.07**	-0.07**
Reading scores t1	(0.02)	(0.01)	(0.02)	(0.02)
Constant	1.04***	0.39***	2.20***	1.81***
	(0.25)	(0.09)	(0.22)	(0.26)
Observations	195	195	195	195

Source: JEPS. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.
t1: beginning of the last preschool year. Reading scores at t1 are mean centered.

5.6.2 Summer learning and school-year learning of children from different family backgrounds

Following my analysis of gaps between high- and low-performing students, I now focus on gaps between children from different family backgrounds. In the United States, the gap between a child whose highest educated parent finished high school and one whose highest educated parent holds a master's degree increased from 3.2 points at the beginning of preschool to about 8 points at the end of elementary school. Thus, at the end of elementary school, children whose highest educated parent finished high school lagged behind their peers whose parent held a master's degree by 80% in relation to what students learned within a school year. In Finland, the initial difference was greater. Children whose parents had high school diplomas lagged behind their peers whose parents had master's degrees by 5.6 points corresponding to half a school year. However, the gap subsequently declined to 1.8 points, corresponding to about 1.5 months of learning until the end of grade 1.

An assessment of the influence of family backgrounds on learning during the summer when schools were closed revealed that despite differing levels of parental education, families in Finland provided more equal learning opportunities compared with families in the United States. In the United States, the gap in reading performance widened during the summer when schools were closed, whereas it remained relatively stable or only showed a slight increase in Finland (Tables 5.4 and 5.5). For example, a child in the United States whose parents attained high school diplomas learned 0.20 points less per month during the summer (0.04*5 years longer in education) than a child who had at least one parent who had attained a master's degree (Table 5.4). This amount appears small. However, it corresponded to almost 50% of what an average child learned during the summer, given that the results were reported monthly. The difference in the learning of a child in Finland corresponded to 0.05 points, thus amounting to just one-fourth of the effect in the United States. This indicates that Finnish families (or, more accurately, Finnish non-school environments) offer more equal learning opportunities than do American families. The finding that non-school environments are more unequal in the United States than in Finland did not change when alternative indicators of family background or mathematics or reading scores were used. Parental education had a stronger effect on learning rates during the summer, even when race and single parenting in the United States were controlled for. Thus, learning opportunities within families with different education levels in the United States are evidently more unequal than they are in Finland. This finding also applied to white two-parent families.

What about the effect of schools? In Finland, children with parents whose education levels were low succeeded in catching up in reading during the school year but not during the summer holidays (see Table 5.5, models 3–5). This suggests that schools contribute to the more equal performance of Finnish children by boosting the performance of children whose parents have a lower education level than those of their peers. The findings of the analysis did not show a similar equalizing effect of schools in the United States. Achievement gaps between children from well-educated and poorly educated families increased throughout

preschool, summer, and grade 1 (see Table 5.4). Thus, schooling does not reduce the achievement gap associated with parents' education in the United States. In Finland, by contrast, schools compensate for this gap to some degree. The compensatory effect of schooling in Finland was quite substantive. The reading gap decreased by 0.1 points in each month during the school year. This may seem like an insignificant amount, but it indicated that the gap between a child whose highest educated parent finished high school and a child whose highest educated parent held a master's degree narrowed from 5.6 points to 1.8 points during grade 1. Thus, whereas these children lagged behind by half a school year at the beginning of grade 1, the remaining gap at the end of grade 1 was reduced to about 1.5 months of learning.

In Finland, children from different socioeconomic backgrounds generally attend the same schools, whereas in the United States, children are much more segregated by socioeconomic background. Thus, in Finland, approximately 13% of the variance in parents' education lies between schools, whereas in the United States, the figure is 40%. Higher school segregation tends to be linked to a higher level of inequality relating to school quality. The question then is whether this high level of inequality in relation to school quality contributes to greater performance inequalities between children in the United States compared with children in Finland. If this is the case, then performance gaps between children attending schools of different quality would be expected to grow. To test this, I applied multilevel models differentiating effects within and between schools. My rationale was that if greater inequalities between schools in the United States were the main reason for the differences in the findings for Finland and the United States, then these differences would vanish when variance between students attending the same school was examined.

In Finland, reading gaps by parents' education levels shrank within schools (see Table 5.5). When children with lower educated parents and those with higher educated parents were placed in the same classroom, the former caught up with the latter. This effect did not occur when children attended different schools. In the United States, reading gaps linked to parents' education widened because these gaps also widened between schools. Thus, inequalities between schools contributed to rising inequality in the United States, whereas there is no indication that such an effect occurred in Finland.[10]

[10] In the United States, the results remain unchanged whether all students were included in the analysis or just those who did not change their schools between preschool and grade 1.

Table 5.4: Influence of parents' education on monthly learning rates for reading by season in the United States

		(1) Points at the beginning of kindergarten	(2) Points gained per month, kindergarten	(3) Points gained per month, summer	(4) Points gained per month, first grade	(5) Contrast: First grade - summer
		b/se	b/se	b/se	b/se	b/se
Overall	Parents' years of education	0.53***	0.03***	0.04***	0.06***	0.02*
		(0.03)	(0.00)	(0.01)	(0.01)	(0.01)
	Constant	9.91***	0.75***	0.50***	1.52***	1.02***
		(0.12)	(0.02)	(0.02)	(0.02)	(0.03)
Within schools	Parents' years of education	0.39***	0.03***	0.03***	0.04***	0.01
		(0.04)	(0.01)	(0.01)	(0.01)	(0.01)
	Constant	9.98***	0.75***	0.49***	1.54***	1.05***
		(0.10)	(0.01)	(0.01)	(0.02)	(0.02)
Between schools	Parents' years of education	0.76***	0.05***	0.05***	0.11***	0.06***
		(0.07)	(0.01)	(0.01)	(0.01)	(0.02)
	Constant	10.02***	0.78***	0.59***	1.44***	0.85***
		(0.25)	(0.03)	(0.03)	(0.05)	(0.06)
	Observations	3890	3890	3890	3890	3890

Source: ECLS-K 1999. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Table 5.5: Influence of parents' education on monthly learning rates for reading by season within and between schools in Finland

		(1) Points at the beginning of kindergarten	(2) Points gained per month, kindergarten	(3) Points gained per month, summer	(4) Points gained per month, first grade	(5) Contrast: First grade - summer
		b/se	b/se	b/se	b/se	b/se
Overall	Parents' years of education	1.11***	0.00	0.01	-0.12***	-0.12**
		(0.22)	(0.02)	(0.02)	(0.03)	(0.04)
	Constant	9.40***	0.75***	0.31***	1.64***	1.34***
		(0.72)	(0.09)	(0.05)	(0.10)	(0.13)
Within schools	Parents' years of education	0.95***	0.01	0.01	-0.11**	-0.12**
		(0.25)	(0.03)	(0.02)	(0.04)	(0.04)
	Constant	9.59***	0.76***	0.30***	1.62***	1.32***
		(0.76)	(0.08)	(0.06)	(0.11)	(0.13)
Between schools	Parents' years of education	1.33**	-0.05	-0.03	-0.04	-0.01
		(0.44)	(0.06)	(0.03)	(0.08)	(0.09)
	Constant	8.47***	0.61**	0.32***	1.94***	1.62***
		(1.34)	(0.17)	(0.07)	(0.22)	(0.24)
	Observations	189	189	189	189	189

Source: JEPS. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

5.6.3 Robustness checks

5.6.1 Language differences?

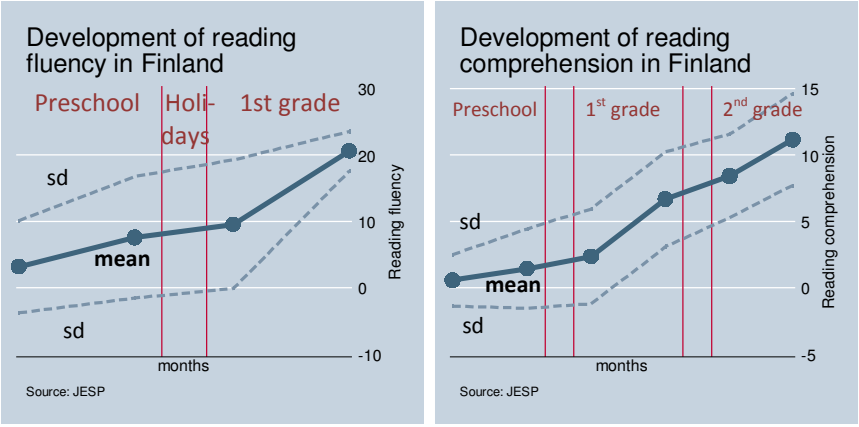
There were some drawbacks in the study that could require cautious treatment of the findings for reading performance. One of these concerns differences between the English and Finnish languages. Whereas the Finnish orthography is very straightforward, the English orthography is very inconsistent (Aro & Wimmer, 2003). Aro and Wimmer (2003) compared the development of reading accuracy in English among children with the development of their reading accuracy in languages with a more regular orthography, notably German, Dutch, Swedish, French, Spanish, and Finnish. The results indicated that Finnish-speaking children achieved the highest level of reading accuracy, whereas English-speaking children achieved the lowest level of accuracy at the end of grade 1. Therefore, nearly all Finnish children would be expected to have achieved reading accuracy at the end of grade 1, implying that

there is a ceiling effect for this competence. As the Finnish reading test included a component on reading fluency, there may have been a ceiling effect operating in the test.

Aro and Wimmer (2003) were unable to distinguish between the effects of school, age, and language. It is thus impossible to ascertain from their results whether Finnish children's proficiency in reading after grade 1 was due to Finnish being easy to read, the high quality of instruction in Finland, or faster learning of Finnish children because their age at school entry is above that of children entering school in most other countries. However, the authors drew attention to differences between languages that influenced how children learned to read. The question thus remains as to why low-performing children catch up in reading during grade 1 in Finland, whereas they fall further behind in the United States. Is this because the process of learning differs markedly between the two languages, or is this because schooling has an equalizing effect in Finland but not in the United States?

To better understand the influence of language specificities, I conducted separate analyses for reading fluency and reading comprehension (Figure 5.3). Like Aro and Wimmer (2003), I found that all Finnish children were able to read a story aloud fluently at the end of grade 1. As this ability may not only be influenced by good teaching but may also be attributed to the clarity of Finnish orthography, I subsequently analyzed how well children were able to understand sentences. This competence did not have a ceiling at the end of first grade. Indeed, test scores did not converge. Nonetheless, I still found that schooling had an effect on inequality in test scores. Though inequality increased before children entered school, this process was checked with the onset of systematic instruction. Contrasting with the situation in the United States, disparities in reading scores did not increase after the children entered school.[11]

Figure 5.3: Development of reading fluency and reading comprehension by season in Finland

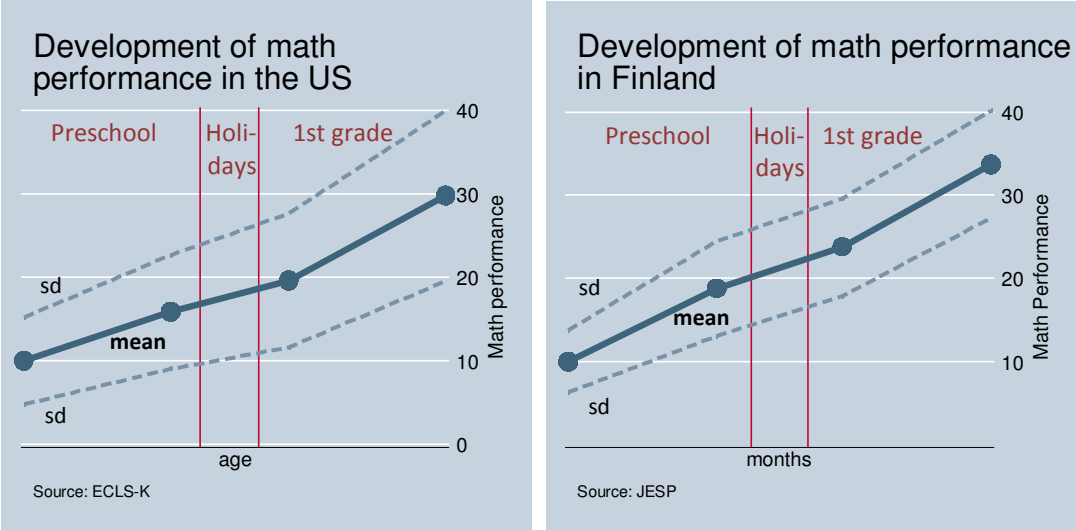


[11] However, the problem with reading comprehension is that before children start school, most of them are not yet able to understand sentences. This indicates strong floor effects for the early measurements. For children in grade 2, for whom there was no evidence of any floor effects, there was no evidence of an equalizing effect of schooling.

5.6.2 Mathematics

To obtain results that were less influenced by differences between the Finnish and English languages, I also analyzed mathematics performance.[12] As with reading, children improved faster in mathematics during the school year than they did during the summer break when schools were closed (see Figure 5.4). In the United States, children learned about double as much mathematics per month during grade 1 than they did during summer. This school effect appears to be lower in Finland, where learning rates were accelerated by about one-third when children entered school. This finding indicates that the research design was not well suited to the Finnish data for mathematics. Hence, even though tests in mathematics may have been comparable across the two countries, the research design did not work well for Finland.

Figure 5.4: Development of mathematics performance by season in the United States and Finland

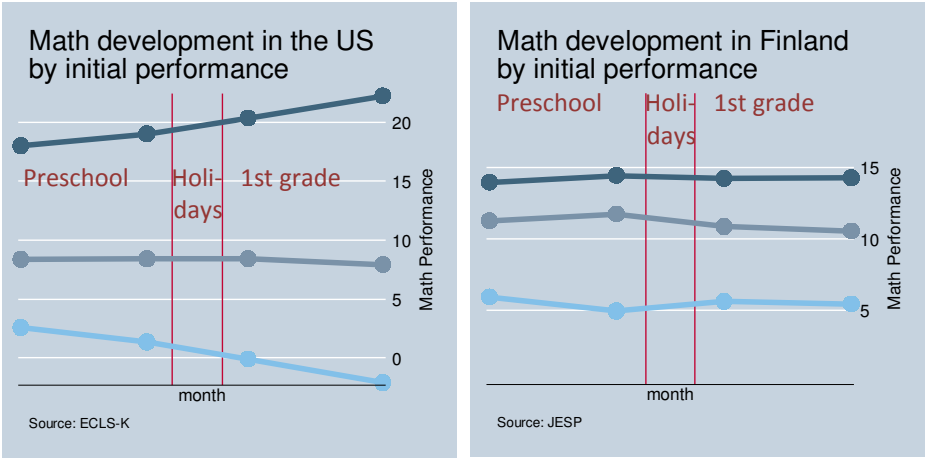


The results indicated that in the United States, children's mathematics test scores diverged over time. In Finland, inequality in mathematics test scores increased to some extent in preschool but remained at a similar level or decreased slightly thereafter. Figure 5.5, which graphically depicts the development of inequalities, shows the development of scores for children who scored in the upper, middle, and lower third of the first mathematics test. The figure focused only on inequalities and not on whether children learned more during summer or during grade 1. Therefore , it is based on de-meaned scores, from which I subtracted the mean of each wave .When children began their last year of kindergarten, the average difference between the bottom and top terciles of children in the United States was 1.5 times of what children learned during grade 1. This difference was smaller in Finland. Nevertheless, this still means that on average a child from the highest tercile was slightly less than one

[12] I did not analyze mathematics performance on its own for two reasons. First, at the end of elementary school, Finnish children outperformed their US peers to a much greater extent in reading than in mathematics (both in the TIMSS and in the PIRLS). Country differences may therefore have been less strong in mathematics. Second, the research design seemed to work less effectively for mathematics than for reading in Finland.

school year ahead of a child in the lowest tercile. In Finland, the gap remained relatively stable, whereas the already larger gap in the United States continued to grow over time. At the end of grade 1, the lower-performing third of the children in the United States were already about 2.5 school years behind their higher performing peers in mathematics.

Figure 5.5: Development of inequalities in mathematics performance by season in the United States and Finland



What is the role of families in the development of inequalities in mathematics performance? In the United States, families (or more generally the non-school environment) were found to contribute to growing inequalities as indicated by growing inequalities in mathematics during the summer holidays when schools were closed (see Table 5.6, model 2). In Finland, inequalities in test scores remained stable or even declined during the summer holidays (see Table 5.7, model 2). Thus, families provided more equal learning opportunities in Finland than they did in the United States for both reading and mathematics.

So what is the role of schools for the development of inequalities in mathematics over and above the effect of families? Even though the effect is not apparent from the Figure 5.2, the interaction of initial mathematics scores with learning rates showed that in the United States, schooling slightly reduced the growth of inequalities in mathematics (see Table 5.6, model 4). This is because inequalities between children attending the same schools grew less during the school year than during the summer holidays (see Table 5.6, model 4). Thus, schools can equalize learning rates for children attending the same school. However, between schools, if anything, inequalities in mathematics performance increased during the school year compared with the summer holidays. To sum up, findings for both mathematics and reading performance support the view that achievement gaps in the United States would be larger without schools, because learning opportunities experienced by children attending the same schools are more similar during the school year.

Even though the data indicated a strong compensatory effect of schooling for reading performance in Finland, this did not appear to be the case for performance in mathematics. Low-performing children caught up slightly during the summer before they entered school as well as during grade 1 (see Table 5.7). Thus, despite the fact that inequalities evidenced a slight decline, they did not develop differently when school started compared with their

development during the summer holidays. If anything, they declined less. This does not mean that schools have no effect on students' learning of mathematics. In fact, schools evidently prompted accelerated learning in both Finland and the United States. However, they only equalized children's mathematics performance in the United States and not in Finland. It is not clear why I do not find an equalizing effect of schooling for mathematics for Finland, even though it appeared to be very strong for reading. On the one hand, the research design was not very effective for mathematics. On the other hand, it may be that reading and mathematics are influenced differently by schooling.

Table 5.6: Correlation of mathematics learning rates with initial knowledge in the United States

		(1) Points gained per month, kindergarten b/se	(2) Points gained per month, summer b/se	(3) Points gained per month, first grade b/se	(4) Contrast: First grade - summer b/se
Overall	Initial points	0.01***	0.03***	0.02***	-0.01~
		(0.00)	(0.00)	(0.00)	(0.00)
	Constant	0.90***	0.40***	1.27***	0.87***
		(0.03)	(0.04)	(0.04)	(0.06)
Within schools	Initial points	0.00	0.03***	0.02***	-0.01*
		(0.00)	(0.00)	(0.00)	(0.00)
	Constant	0.94***	0.40***	1.29***	0.89***
		(0.03)	(0.03)	(0.04)	(0.05)
Between schools	Initial points	0.04***	0.02**	0.03***	0.01
		(0.01)	(0.01)	(0.01)	(0.01)
	Constant	0.53***	0.50***	1.16***	0.66***
		(0.06)	(0.08)	(0.08)	(0.12)
	Observations	3,725	3,725	3,725	3,725

Source: ECLS-K 1999. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Table 5.7: Correlation of mathematics learning rates with initial knowledge in Finland

		(1) Points gained per month, kindergarten b/se	(2) Points gained per month, summer b/se	(3) Points gained per month, first grade b/se	(4) Contrast: First grade - summer b/se
Overall	Initial points	0.04***	-0.02	-0.01	0.01
		(0.01)	(0.01)	(0.01)	(0.02)
	Constant	0.98***	1.13***	1.64***	0.51*
		(0.11)	(0.16)	(0.14)	(0.23)
Within schools	Initial points	0.03**	-0.02	-0.01	0.01
		(0.01)	(0.02)	(0.01)	(0.02)
	Constant	1.00***	1.12***	1.64***	0.53*
		(0.11)	(0.16)	(0.14)	(0.23)
Between schools	Initial points	0.03	-0.02	-0.05	-0.02
		(0.03)	(0.04)	(0.03)	(0.05)
	Constant	0.99**	1.15**	1.95***	0.79
		(0.34)	(0.38)	(0.30)	(0.51)
	Observations	195	195	195	195

Source: JEPS. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

An analysis of the results relating to achievement gaps between students from different socioeconomic backgrounds indicated that those for reading pointed to a compensatory effect of schooling in Finland, whereas those for mathematics did not reveal the same pattern. During the school year, the effects of family background on mathematics learning remained similar to those observed during the summer in both Finland and the United States (see Tables 5.8 and 5.9).[13] Thus, in neither of these countries did the findings indicate that schooling equalized mathematics performance between children whose parents had different levels of education. This finding would support the claim that inequality in test scores is high in the United States not because of the different education systems but because there is significant inequality between families in this country.[14]

[13] In relative terms, it could be argued that inequalities grow less during the school year as children learn more during grade 1. In other words, the differences might matter less.

[14] It is not clear why the effect of parental education on mathematics learning in Finland increased most during preschool.

Table 5.8: The influence of parents' education on monthly learning rates in mathematics by season in in the United States

	(1) Points at the beginning of kindergarten b/se	(2) Points gained per month, kindergarten b/se	(3) Points gained per month, summer b/se	(4) Points gained per month, first grade b/se	(5) Contrast: First grade - summer b/se
Parents' years of education	0.91***	0.03***	0.04***	0.05***	0.01
	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)
Constant	10.52***	0.96***	0.79***	1.53***	0.74***
	(0.16)	(0.02)	(0.03)	(0.03)	(0.04)
Observations	3,890	3,890	3,890	3,890	3,890

Source: ECLS-K 1999. All models were controlled for gender. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

Table 5.9: Influence of parents' education on monthly learning rates in mathematics by season in Finland

	(1) Points at the beginning of kindergarten b/se	(2) Points gained per month, kindergarten b/se	(3) Points gained per month, summer b/se	(4) Points gained per month, first grade b/se	(5) Contrast: First grade - summer b/se
Parents' years of education	0.50***	0.04**	0.01	0.02	0.00
	(0.10)	(0.01)	(0.02)	(0.02)	(0.03)
Constant	9.72***	1.33***	0.87***	1.63***	0.76***
	(0.41)	(0.06)	(0.07)	(0.09)	(0.13)
Observations	189	189	189	189	189

Source: JEPS. All models were controlled for gender. Standard errors in parentheses. * p<0.05, ** p<0.01, *** p<0.001.

To conclude, the finding that the non-school environments in which children are raised is more unequal in the United States than in Finland was consistent for both reading and mathematics. During the summer, general inequalities and those associated with parents' education increased more in the United States than in Finland. The findings for reading indicated a strong equalizing effect of schooling in Finland. In the United States, schooling had a slightly equalizing effect on general inequalities and a slightly reinforcing effect on inequalities related to parents' education. Preschools also seemed to compensate for some of the family-related inequality in reading in Finland, whereas they did not do so in the United States. For mathematics, however, there was no evidence of any influence of schools on inequalities in test scores in either of the two countries. Therefore, it is less apparent how the effect of schooling differed between the two countries. However, inequalities by parents' education expanded between schools in the United States, whereas they did not do so in

Finland. This finding supports the conclusion that inequalities between schools in the United States led to increased inequalities in test scores, whereas elementary schools in Finland did not prompt increased inequalities in test scores.

5.7 Discussion and conclusions

Is Finland successful in combining high levels of average student performance and educational equality, because Finnish schools provide students with equal opportunities independent of socioeconomic backgrounds, or because families provide relatively equal learning opportunities? To investigate this question, I compared children's learning rates during the summer with their learning rates during preschool and grade 1 in Finland and in the United States. During the summer, learning is shaped solely by non-school influences, whereas during the school year, schools influence learning over and above the effect of families. By comparing the extent to which learning rates were unequal during the 10-week summer break in both Finland and the United States, I was able to investigate whether families in the former country provide more equal learning opportunities than families in the latter country. Further, by comparing changes in the inequality of learning rates among children during the school year with learning rates during the summer, I was able to investigate the effect of schooling in both countries.

Finland's ranking is outstanding in international comparative assessments such as the PISA or PIRLS study, because all students in this country perform well—even academically weak students or those from disadvantaged families. High-SES students perform well everywhere, regardless of whether they live in Finland or the United States. Both of these countries have high proportions of top performers. However, given that the difference between the two countries is greatest between weak and socioeconomically disadvantaged students, I argue that lower inequality levels relating to cognitive performance contribute to Finland's high performance ranking internationally. This argument can only be made indirectly, because the reading and mathematics tests applied in these countries and the resulting datasets that were employed in this study could not be directly compared. Unlike the uniform tests administered in cross-sectional international comparative assessments such as the PISA or PIRLS study, the tests taken by children in the two respective countries differed. However, the advantage of using longitudinal data was that it enabled family and schooling effects to be separated during preschool, summer, and grade 1.

In conducting this investigation, I found that gaps between high- and low-performing children as well as gaps between children whose parents were well educated and poorly educated increased during the summer in the United States. In Finland, by contrast, these gaps remained mostly stable or only increased slightly. As summer learning is only influenced by non-school factors, this finding suggests that inequality in test scores is higher in the United States than in Finland, because families provide more unequal learning opportunities in the former country than in the latter. Conversely, the lower degree of socioeconomic inequalities between families contributes to Finland's high level of educational equality. Further, the higher racial diversity in the United States contributes to higher educational inequalities.

However, the findings held even when race and family structure were controlled for. Thus, even when only white students from two-parent families were included in the US analysis, SES achievement gaps still showed a greater increase in the United States than they did in Finland.

In sum, inequalities existing outside of school contribute to how children fare in international student assessments such as the PISA study. There are two key consequences associated with this the importance of non-school environments for educational inequality. The first is an analytical consequence, namely that the effect of education systems is overestimated in international comparisons that do not consider differences in family conditions. The second consequence is political. Accordingly, countries such as the United States should introduce social and labor market policies that improve conditions for children of disadvantaged families outside of schools. These social policies would constitute an effective "education" policy in the United States. Thus, instead of sending only teachers to Finland, many countries should also send their social workers, welfare specialists, and health care politicians to Finland to learn from their welfare state policies.

In addition to the role of families in contributing to lower inequalities in reading scores in Finland, there are indications that schools play a role in this regard. In Finland, low-performing students and those whose parents have low education levels catch up in reading during the school year and not during the summer. This equalizing effect of schools is also apparent in the United States where performance inequalities grow less during the school year than they do during the summer. Performance inequalities would be larger without the influence of schools in both countries, because children attending the same schools are exposed to more similar learning opportunities during the school year than they are during summer. This finding is consistent with the US literature on seasonal learning (Alexander et al., 2001; Downey et al., 2004; Heyns, 1978).

However, the equalizing effect of schooling on reading scores is stronger in Finland than it is in the United States where achievement gaps between schools increase during the school year. Thus, inequalities between schools in the United States contribute to growing inequalities. Schools in this country are highly segregated by family background, which is not the case in Finland. Therefore, US schools do serve as equalizers, but only when children attend the same school. Nonetheless, Finnish schools are better equalizers compared with US schools.

There are some potential critiques relating to the nature of the Finnish data. First, because the data were gathered in just one region, they may be considered unrepresentative, with some arguing that inequalities in Finland were therefore underestimated. However, a comparison of the data obtained in this study with registry data shows a very similar distribution of people in terms of education and social class. In addition, given my interest in investigating changes over time, I focused on examining how learning varies over the course of the year in my analysis, controlling for regional time-constant factors. The second potential critique of the data relates to the small sample size entailing a limited number of schools. However, the TIMSS, PIRLS, and PISA studies show that there is no significant variation between schools and classrooms in Finland. Therefore, even though the results of my analysis should be treated with caution, there are reasons to believe the findings are generalizable.

Nonetheless, gathering data that would enable researchers to reproduce these results with a nationally representative dataset on summer learning and school-year learning would be an important avenue for future research. In addition, international cooperation in the conduct of longitudinal studies to promote the deployment of comparable competence tests would be helpful. For future research, it would also be useful for researchers to investigate why Finland has not been successful in integrating the children of immigrants into its education system, even though schools are able to equalize the performance of Finnish students from socioeconomically disadvantaged families.

To sum up, the finding that during the summer, cognitive inequalities are relatively stable in Finland, whereas they grow in the United States supports the notion that a lower level of inequality between families contributes to a higher performance of disadvantaged students in Finland. In addition, the fact that lower-performing children catch up during the school year is a strong finding countering the claim in the literature that the sole reason for Finland's high performance in international assessments is better family conditions within disadvantaged families. Finland is a high-performing country in international comparative assessments, because its low-performing students perform well in comparison to low-performing students in other countries. Because low-performing children catch up only during the school year, schools evidently contribute to the high performance of Finnish children, especially those at the lower end of the competence distribution. At the same time, international studies have found that high-performing children in Finland also perform comparatively well in relation to high-performing students in other countries. Hence, low-performing children do not catch up at the cost of high-performing children, even if they attend the same schools.

Thus, the findings of this study endorse the view that those wishing to live the American Dream should move to Finland. Finnish families and schools provide students with the opportunity to succeed in education, regardless of their social backgrounds, to a much greater extent than do families and schools in almost every other country in the world. This is what the American Dream is all about. If the goal is to live the American Dream in the United States, then educational reforms will be required to combat inequalities between schools in the country as well as social and labor market reforms to combat inequality prevailing outside of the education system.

5.8 Appendix

A5.1: The US and Finland in different international student assessments

Table A5.1: USA and Finland in international student assessments in mathematics at the end of primary education and the end of lower secondary education: difference in reading performance USA - FIN

	Country average	Disadvantaged students	Advantaged students	25th percentile	75th percentile
PIRLS 2011, 4th grade	-12	?	?	-18	-4
PISA 2009, age 15	-36	-53	-7	-48	-28

Table A5.2: USA and Finland in international student assessments in mathematics at the end of primary education and the end of lower secondary education: difference in mathematics performance USA - FIN

	Country average	Disadvantaged students	Advantaged students	25th percentile	75th percentile
TIMSS 2011, 4th grade	-4	?	?	-10	1
TIMSS 2011, 8th grade	-5	?	?	-13	3
PISA 2012, age 15	-38	-46	-23	-45	-34
PISA 2009, age 15	-54	-73	-23	-62	-48

6. Excellence through equality of opportunity: Can increasing the socioeconomic inclusiveness of education systems benefit disadvantaged students without harming advantaged students?

Abstract[15]

A prevailing view among middle- and upper-class parents is that while school systems in which students from different socioeconomic backgrounds learn together in the same schools promote equal opportunities, they have adverse consequences on their children. My investigation of this belief constitutes a conceptual and a methodological contribution to the existing literature. Conceptually I broaden the concept of differentiation in education, arguing that not only formal differentiation but also more "hidden" forms of differentiation such as residential segregation or private schools could contribute to the segregation of students from differing socioeconomic backgrounds within separate schools. Methodologically I contribute to the debate on educational differentiation by analyzing changes within countries, controlling for time-constant unobserved differences between these countries. Using five waves of PISA data covering 35 countries for the period 2000–2012, I find that students from disadvantaged families improved their performance within education systems that had undergone a shift toward more socioeconomically inclusive schools. Students from better-off families perform well independently of whether or not the education system becomes more socioeconomically segregated or inclusive. Thus, there is no conflict between equality of opportunity and excellence in education. Rather, my findings indicate that excellence can be improved through equality of opportunity without hindering advantaged students or top performers.

6.1 Introduction

There is a widespread perception among middle- and upper-class parents that a school system in which students from different socioeconomic backgrounds and with different ability levels learn together within the same schools would harm their children, because it may be necessary for teachers to reduce the pace of instruction or because the school climate and motivation could deteriorate. However, a school system in which students from different socioeconomic backgrounds and with different abilities attend separate schools could actually

[15] This chapter has been published with only minor changes as Holtmann, Anne Christine (2016): Excellence through equality of opportunity. Increasing education systems' social inclusiveness benefits disadvantaged students without harming advantaged students. In Blossfeld, H.-P., Buchholz, S., Skopek, J., and Triventi, M. (Eds.), Models of Secondary Education and Social Inequality – An International Comparison. Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing. pp. 61-78.

foster disadvantageous school environments characterized by lower expectations, motivation, and teaching quality for low-performing or socioeconomically disadvantaged students. This chapter examines whether the following trade-off occurs: Does an integrated school system hamper socioeconomically advantaged and high-achieving students while benefitting socioeconomically disadvantaged and low-achieving students? I attempt to answer this question by contributing conceptually and methodologically to the literature on differentiation in secondary education and its consequences for educational achievement. Conceptually, I broaden the perspective on differentiation within education, which largely focuses exclusively on formal external tracking. Besides tracking, there are also more "hidden" forms of differentiation that contribute to segregating students in terms of their socioeconomic backgrounds and abilities. I argue that especially in an international comparative context, it is important to consider mechanisms other than tracking that may be operative, leading to the differentiation of students in terms of their socioeconomic backgrounds and abilities and expanding inequalities in school quality. Therefore, I used the socioeconomic segregation of schools—defined as the extent to which students from different socioeconomic backgrounds attend separate schools—as a measure of differentiation within secondary education.

In addition to my theoretical contribution of broadening the concept of differentiation, in this chapter I present a methodological contribution. Questions about the effects of educational differentiation within the literature are often addressed by comparing countries where students were separated into different educational tracks at an early age to countries where students are tracked at later ages (Horn, 2009; Le Donné, 2014). However, this comparison proves problematic when early tracking is related to unobserved characteristics. In this case, it is not clear whether the performance of students from disadvantaged families is worse in countries with early selection, because tracking creates unfavorable learning environments in lower tracks, or because disadvantaged families in these countries provide more disadvantageous learning environments than such families do in other countries. For example, there may be overlaps with other dimensions of social inequality such as migration backgrounds, neighborhood conditions, or single parenthood. To the extent that these unobserved differences between countries remain constant, I addressed this problem by analyzing changes within countries over time using PISA data from five waves. The question that I attempted to address was: when schools become more integrated by socioeconomic status, how does this affect different groups of students?

The chapter is structured as follows: I begin by explaining the concept of formal and "hidden" differentiation in secondary education, discussing why less differentiation could benefit disadvantaged children without affecting advantaged students and outlining methodological problems. Subsequently, I explain the research design and present the results of my analysis.

6.2 Formal and "Hidden" Differentiation in Secondary Education

Whether students with differing socioeconomic backgrounds and abilities are taught together in the same schools or attend different schools varies between education systems. This is due, on the one hand, to variations in formal differentiation and, on the other hand, to "hidden"

forms of differentiation. The comparative literature on the effects of differentiation in secondary education focuses largely on formal differentiation. Formal differentiation entails the separation of students into different school types or tracks/programs at some point in their schooling. The intention behind differentiation is to homogenize the student body so that teachers can tailor their instruction to fit students' needs and interests. However, because students' performance, interests, and aspirations are influenced by their families, tracking reinforces socioeconomic segregation between schools.

Moreover, an exclusive focus on formal differentiation leads to the omission of more hidden forms of differentiation. Even in comprehensive education systems, middle- and upper-class parents find ways to differentiate their children from others and ensure that they attend high-quality schools. In some countries, parents are free to choose their children's schools, reinforcing school segregation because parents' school choices vary according to their socioeconomic backgrounds. Moreover, schools may also select students. Nonetheless, even when children are required to attend schools located within their residential districts, those from differing family backgrounds attend different schools to the extent that there is residential segregation (Burgess & Briggs, 2010). To sum up, formal and informal differentiation within secondary education entails differential attendance of schools by students whose socioeconomic backgrounds and abilities vary. To capture both formal and hidden differentiation within education systems, I examined the extent of schools' socioeconomic segregation within a country, defined as the extent to which students from varying socioeconomic backgrounds attend separate schools (see section 6.5.2 of this chapter).

Formal differentiation is intended to separate students according to their abilities, creating academically homogeneous groups. This implies that performance variance is high between schools but low within schools. I did not use this indicator for differentiating abilities between schools, because changes in variance between schools were not independent of changes in my dependent variable, namely changes in the performance of different groups of students. However, differentiation according to SES and abilities are positively related (see Figure A6.1 in the appendix of this chapter). In general, within countries that engage in early tracking, not just children with varying performance levels but also children from different socioeconomic backgrounds attend separate schools. Therefore, indicators of both formal differentiation, such as the age of students at the first selection, as well as informal differentiation, such as socioeconomic segregation among schools, would lead to the classification of these education systems as unequal (see Figure A6.2 in the appendix of this chapter). However, there are also countries such as the United States where tracking does not occur at an early phase that are nonetheless characterized by a high level of socioeconomic segregation among schools. Thus, even though both Finland and the United States only separate students at the age of 16 years, the Nordic countries have the most socioeconomically inclusive education systems, whereas that of the United States is among the most socioeconomically segregated OECD countries (OECD, 2013b). These differences cannot be captured with a single indicator focusing on formal differentiation. Consequently, I applied socioeconomic segregation among schools as an indicator of the informal differentiation of an education system.

6.3 Why less differentiation could boost disadvantaged students' performance without harming advantaged students

Why might an education system's socioeconomic segregation matter for students' performance? The concentration of socioeconomically disadvantaged students creates disadvantaged schools in terms of peers, teachers, and the quality of instruction. Peer effects could lead to deterioration of the school climate, reducing motivation and influencing the quality of instruction. In schools that have a higher proportion of students from disadvantaged families with seemingly lower abilities, teachers tend to have lower expectations of these students and therefore reduce the pace of instruction. Schools with many students who are perceived to be difficult have problems attracting good teachers (Gamoran & Berends, 1987). When schools are perceived to be of low quality and have problems attracting good teachers, parents with high educational aspirations will try to avoid them. Consequently, the concentration of disadvantaged students in these schools is reinforced. Because differentiation relating to socioeconomic backgrounds traps students from disadvantaged families in disadvantageous schools (Oakes, 1985; Gamoran & Berends, 1987; Bifulco et al., 2008), I expected students from disadvantaged families to perform worse in socioeconomically segregated education systems than in socioeconomically integrated education systems (Hypothesis 1).

Those who advocate differentiation of students do so, because they fear that the performance of high-performing students and those from socioeconomically advantaged families will be constrained if they are taught together with students from disadvantaged families who tend to perform worse at school (Hoxby, 2003). For example, most German parents believe that it is better for good students to be taught together with other good students (Süßlin, 2013). These positions, considered together, indicate that there may be a trade-off between the promotion of high-performing and socioeconomically advantaged students on the one hand, and low-performing and socioeconomically disadvantaged students on the other hand.

Countering the view of a trade-off, there are arguments that explicate why an inclusive school system would benefit students from disadvantaged families, while ensuring that students from advantaged families do not lose out. Good learning opportunities at school may be especially important for students from lower socioeconomic groups and migrant backgrounds, because they can potentially compensate for less stimulation and support provided within families (Coleman, 1966; Alexander et al., 2001). Advocates of inclusive school systems argue that students from socioeconomically advantaged backgrounds may anyhow succeed, either because school quality does not deteriorate when the student body becomes more mixed or because their parents are able to compensate for their attendance at a poor quality school. School quality may also not suffer, because advantaged parents hold teachers responsible for their teaching, or else because more advanced students can gain a deeper understanding when explaining a topic to less advanced students, thereby benefitting from an enriched classroom discussion that encompasses more diverse perspectives. To sum up, children from privileged families may not be harmed by an integrated education system but will succeed anyhow.

Building on these arguments, my hypothesis is that there is no trade-off between the performance of students from different socioeconomic backgrounds and those with different abilities. Specifically, I hypothesized that when an education system becomes more integrated according to socioeconomic backgrounds, socioeconomically disadvantaged and low-performing students benefit (Hypothesis 1), while there are no consistent negative effects for students from socioeconomically advantaged families or for high performers (Hypothesis 2). Thus, the position that is examined here is that there is no trade-off between equality of opportunity and excellence in education.

6.4 Literature and methodological challenges

There are two main methodological approaches for analyzing the effects of differentiation on students' performance. The first entails a comparison of countries with different education systems and the second entails an evaluation of institutional reforms. Conceptually, both approaches focus only on formal differentiation, leaving aside more hidden forms of differentiation.

Based on studies that take advantage of institutional differences between school systems, the comparative literature reveals that in early-tracking school systems, the effect of socioeconomic background on students' performance in the PISA study is stronger than it is in comprehensive school systems (Horn, 2009; Van de Werfhorst & Mijs, 2010). This effect is not associated with any advantage relating to average performance levels, because students from disadvantaged families perform better in countries with a later age of selection, whereas students from advantaged families perform similarly in countries with early and late selection (Horn, 2009; Van de Werfhorst & Mijs, 2010; Le Donné, 2014). Thus, the comparative literature finds no trade-off between equality of opportunity and excellence.

Conceptually, the comparative literature focuses on formal differentiation, using the age of students at first selection in an education system and the number of different tracks available as indicators. Le Donné (2014) broadens the perspective by including the number of selective schools and private schools with fees. Nonetheless, school differentiation that occurs because of residential segregation cannot be captured with these variables.

One potential methodological challenge is that educational differentiation may be interwoven with unobserved societal characteristics such as socioeconomic inequality or ethnic diversity. Therefore, achievement gaps may already be wider in early-tracking countries than in comprehensive education systems even before students are separated into different tracks. To address this problem, Hanushek and Woessmann (2006) used a "difference-in-difference" approach. They compared how inequality of outcomes developed from the end of primary school to the end of lower secondary school in countries that track students in between these time points and in countries that do not do so. Using TIMSS and PIRLS data for fourth graders and PISA data for 15-year-old students, they find that early tracking increases educational inequality, because low-performing students are left behind. However, "in no case do some students gain at the expense of others" (Hanushek & Woessmann, 2006, p. 74).

The advantage of applying the difference-in-difference approach is that unobserved differences between countries do not influence the analysis as long as they remain constant. A comparable sample across primary and secondary school is crucial to identify changes within countries. However, as Jakubowski (2010) argues, because the PIRLS and the TIMSS study sample by grade, whereas the PISA samples by age, their respective samples are not comparable.

Van de Werfhorst (2013) has analyzed students' performance in several countries before and after de-tracking reforms were implemented, comparing them with students' performance in countries in which no such reforms took place. His analysis reveals that education systems that became comprehensive experienced a stronger reduction in educational inequality compared with education systems that did not become comprehensive. However, although he traced changes over a long period of time from 1964 to 1980, he was unable to test the assumption that without the reforms, countries that transformed their education system would have developed in the same way as countries that did not implement reforms. This is a strong assumption, because there are reasons why some countries moved from a tracked education system to an untracked education system whereas others did not. Thus, comparative research may tend to overestimate the effect of tracking, because it does not take into account unobserved differences between tracking and non-tracking countries.

Rather than taking advantage of the institutional variations between countries, another possibility entails analyzing the effects of de-tracking education reforms within single countries. Jakubowski et al. (2010) evaluated a Polish school reform that postponed tracking by one year and Kerr et al. (2013) evaluated the Finnish comprehensive school reform from the 1970s that postponed selection by five years. The difference-in-difference estimates calculated by Kerr et al., based on the gradual implementation of the school reform in Finland, reveal the improvement of male students with low-educated parents as a result of the reform. The effect size was marked, corresponding to one-quarter of the effect size of parental education. Even more notable was the finding that the reform had no negative effects on test scores of students from families with higher education levels, even though the age of selection was postponed by 5 years.

To sum up, most studies find that de-tracking has positive effects for low-performing students and those from disadvantaged families, whereas there is no effect on students from advantaged families and high performers. Conceptually, the literature on the effects of differentiation in secondary education is restricted to formal differentiation. Methodologically, studies within this literature may overestimate the effect of tracking when intertwined societal characteristics are not controlled for. To address both of these issues, I analyzed the relationship between changes in schools' socioeconomic segregation and changes in students' performance within countries over cohorts.

6.5 Research design, data, and variables

6.5.1 Dependent Variables: Changes in Test Scores

To investigate the effects of socioeconomic segregation between schools on students' performance, I used students' test scores in the PISA reading assessment as dependent variables (see Table A6.2 in the appendix). The PISA study assesses students' capacities to analyze, reason, and solve problems by applying knowledge to real-life settings. These assessments have been conducted every 3 years commencing from 2000. In each round, one of the subjects reading, mathematics or science constituted the main focus area of the assessment, starting with reading. Consequently, test results could be compared directly over time following the year in which a particular subject was the main focus of the assessment. Hence, reading scores could be compared over all waves, mathematics from 2003 onward, and science from 2006 onward. I shall focus here on reading, although the results for mathematics were very similar. The mean score in the first PISA round conducted within OECD countries was 500 and the standard deviation was 100. To facilitate the interpretation of the scores, the OECD estimates that about 40 points on the PISA scale correspond to the learning progress made by students within one school year (OECD, 2013).

To analyze the effects of changes in socioeconomic segregation on high- and low-performing children, I used the percentage of "low performers" and "top performers" within a country (see Table A6.2 in the appendix). Top performers achieved a proficiency level of 5 or higher, demonstrating their ability to understand texts about unusual topics, apply their knowledge to new situations, and formulate and reflect on their own opinions. Low performers did not even achieve a proficiency level of 2, because they were unable to summarize the main ideas of a text (OECD, 2010).

6.5.2 Independent Variables

I used the Economic Social and Cultural Status (ESCS) index developed by the OECD to measure students' socioeconomic backgrounds (see Table A6.3 in the appendix). This index comprises three components: one for parents' highest educational attainment, one for their highest occupational prestige, and one relating to affluence and cultural goods. To allow for comparability over time, the OECD provides rescaled indices of the ESCS based on the 2012 scale that I merged into every dataset. In my sample, the median ESCS corresponded to zero; the 10th percentile to -1.3; and the 90th percentile to 1.2.

To capture the extent of socioeconomic segregation among schools within a country, I measured how much of the ESCS variance occurred between schools. The estimate was derived from a multilevel analysis in which the ESCS, as the dependent variable, was clustered within schools. The intra-class correlation multiplied by 100 expresses the proportion of variance in socioeconomic backgrounds that can be explained by schools. In Finland, which has the most egalitarian school system, only about 8% of the ESCS variance

lay between schools, whereas in Hungary, which has the most socioeconomically segregated school system, this value rose to 38% (see Table A6.1 in the appendix).

Given that my aim was to compare the index of socioeconomic segregation between schools over time, it was crucial that the definition of schools did not change. There is no common definition of schools across countries, because schools in the PISA study serve primarily as sampling units. For example, in Austria, the Czech Republic, Germany, Hungary, Japan, Romania, and Slovenia, study programs within schools are treated as schools. In Italy, schools are defined as administrative units that can be located on different campuses, whereas in other countries, schools are defined according to school buildings or school principals (OECD, 2013). Although differences in definitions constituted a problem, this was not a severe one, because I was using only changes within countries. The crucial aspect for the present approach was that the definition of schools *within countries* did not change over time. There is no indication of any change in the definition of schools in any of the technical reports accompanying the PISA data (OECD, 2014). Another problem encountered when comparing the socioeconomic segregation index over time results from changes in the stratification variables used to sample schools. Therefore, when calculating socioeconomic segregation, I weighted the data with the final student weights at the student level and with the sum of students' weights within a school at the school level.

6.5.3 Research Strategy and Models

To address the issue of the possible intertwining of tracking with unobserved societal characteristics, I looked at changes *within* countries using five waves of PISA data. Therefore, I ran country fixed effects models that entail the advantage of controlling for all differences remaining constant over time. To analyze only changes *within* countries, I took each variable and subtracted its respective country mean over all waves. Because the socioeconomic conditions under which children are raised can also change over time within a country, I controlled for within-country changes in the average and in the standard deviation of the ESCS.[16]

The dependent variable in my analysis was changes in students' reading performance. The independent variable was students' ESCS and schools' socioeconomic segregation at the country level. In this first model, the outcome of interest was the coefficient of school segregation, which captured how changes in school segregation influenced changes in countries' mean performance. In a second model, I added a cross-level interaction of socioeconomic segregation with students' ESCS to capture how changes in socioeconomic segregation changed the influence of parental background on students' performance.

To compare the effects of changes in the socioeconomic segregation between schools on students from socioeconomically advantaged and disadvantaged backgrounds, I plotted the

[16] I used the student weights provided by the OECD and adjusted them in such a way that each country's wave contributed equally to the results. Considering the sampling design, standard errors could be clustered within schools. To assess whether my results were robust in relation to changes in immigrant populations, I ran two-step estimates in which the effects of being born in a foreign country and having a foreign-born mother or father could differ in each country and at each wave. The results remained the same.

marginal effects of changes in schools' socioeconomic segregation on students' performance in figure 6.2. I used percentages of high and low performers in a country as alternative dependent variables for analyzing how changes in socioeconomic segregation affect the share of high- and low-performing students.

6.5.4 Sample

I restricted the analyses to OECD and EU countries, excluding OECD outliers, namely, Chile, Mexico, and Israel. Thus, the total sample comprised 35 countries. Because I merged five waves for reading and four waves for mathematics, the sample encompassed more than one million students for reading and more than 900,000 students for mathematics who attended over 40,000 schools.

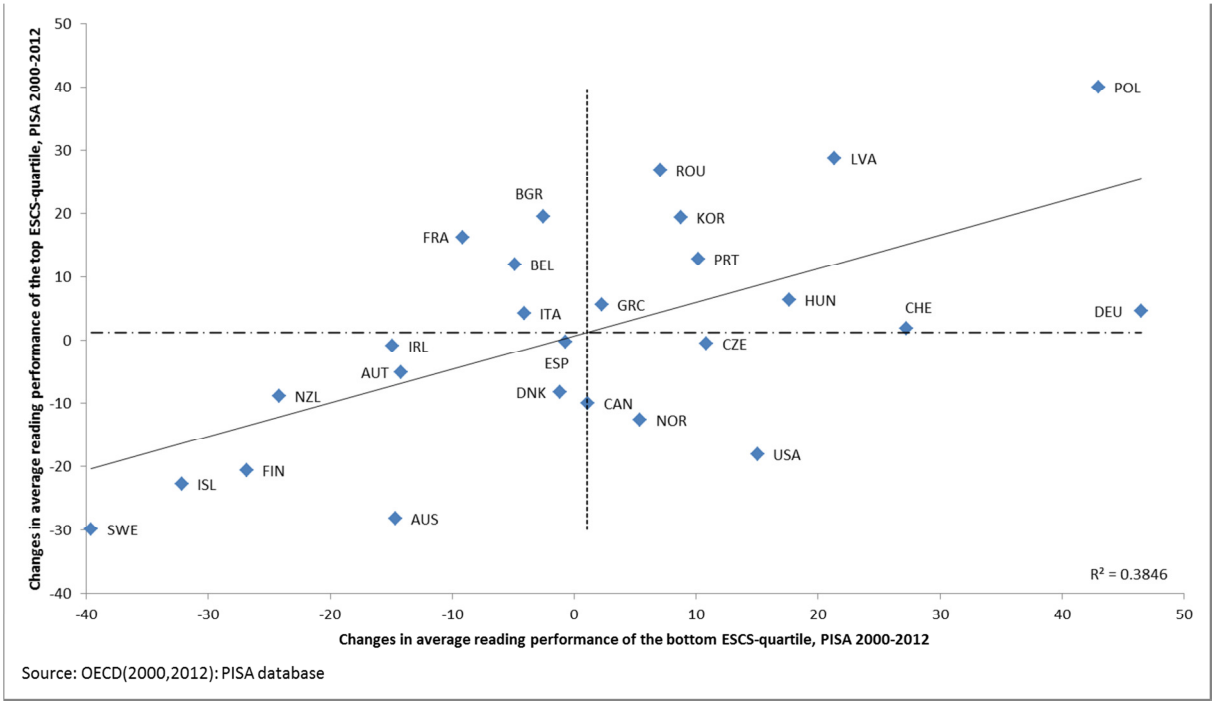
6.6 Results

6.6.1 How students' reading performance evolved over cohorts

Over the 12-year duration of the PISA assessments conducted from 2000 and 2012, the reading performance of socioeconomically disadvantaged students in the bottom quartile of the ESCS showed the most improvement in Germany, Poland, Switzerland, and Latvia (Figure 6.1). The improvement in Poland and Germany, which was around 40 points, corresponded to students' progress over an entire school year. The performance of socioeconomically disadvantaged students had declined in Sweden, Iceland, Finland, and New Zealand one decade after the first PISA test was conducted in these countries.

Interestingly, in two of the countries in which students from socioeconomically disadvantaged families improved the most, namely Poland and Latvia, students from better-off families also showed the most improvement over the cohorts. Similarly, in Sweden, where the performance of students from low-ESCS families evidenced the greatest decline, high-ESCS students also evidenced a decline in their performance. Only in the United States and France were there indications that one group lost out whereas the other gained. The value of the positive correlation between changes in the top and bottom quartiles of the ESCS was 0.62. As shown in Figure 6.1, there was no trade-off between the performances of students from different socioeconomic backgrounds over time: they all appeared to be in the same boat.

Figure 6.1: Changes in reading performance of students in the bottom and top ESCS quartiles, PISA 2000–2012



Source: OECD(2000,2012): PISA database

6.6.2 How socioeconomic segregation of schools evolved over time

Whereas Poland was the only country where formal differentiation changed over the period covered by the PISA studies, there were changes in socioeconomic segregation between schools in several countries. In Turkey, Poland, Japan, Spain, the Netherlands, and Switzerland, schools became less socioeconomically segregated during the period commencing with the first cohort and ending with the last cohort. Conversely, schools in Latvia, Bulgaria, Portugal, Austria, and Romania became more socioeconomically segregated. The changes across the entire sample ranged from a 12 percentage point reduction in Turkey to a 12 percentage point increase in Latvia (see Figure A6.4 in the appendix).

6.6.3 How changes in socioeconomic segregation of schools relate to equality and excellence

Do changes in the socioeconomic segregation within an education system go hand in hand with changes in equality of opportunities? If so, does increasing equality of opportunities occur as a result of decreasing excellence? To answer these questions, I applied country fixed effects models using changes within countries between each wave, whereas the descriptive part ending here provided an overview of changes from the first to the last cohort observed in the PISA studies.

When socioeconomic segregation among schools increased, so did the influence of students' family backgrounds on their performance (see Table 6.1, Model 2). This finding confirmed my first hypothesis, namely that for students from disadvantaged families, a more socioeconomically segregated school system means a reduction in learning opportunities in school in addition to fewer learning opportunities within families. When compared with the main effect of ESCS, however, the effect size was quite small: a student with a one standard deviation higher ESCS than her peers performs on average 38 points higher in the PISA reading test. This amount corresponds to what students learned within an entire school year. By comparison, a one percentage point reduction in socioeconomic segregation from one wave to the next decreased the effect of the ESCS on students' performance by 0.59 points. Because the approximate range of maximum changes in socioeconomic segregation from 2000 to 2012 was from -10 to +10 percentage points, the maximum effect entailed an increase (or decrease) in the effects of ESCS by about 6 points, corresponding to a 15% increase (or decrease) in the effects of ESCS on performance.

Notably, gains in equality of opportunity were not brought about at the cost of excellence. By contrast, increases in the socioeconomic segregation of an education system went hand in hand with decreases in students' average performance level (see Table 6.1, Model 1). When the socioeconomic segregation of an education system increased by about 10 percentage points, the average reading performance level decreased by about 9 points. Thus, increases in equality of opportunity did not cause losses in terms of performance.

Table 6.1: Changes in school segregation within an education system and changes in reading test scores in PISA obtained with country fixed effects models

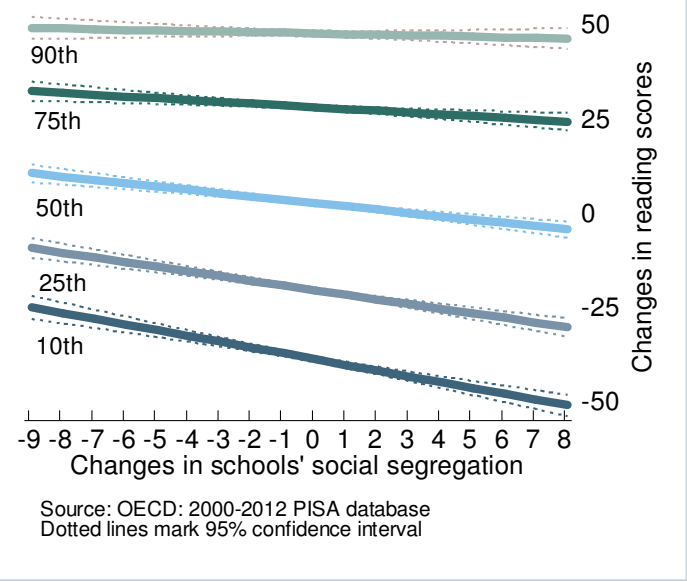
	Changes in reading 2000–12	
	Model 1 b/ci95	Model 2 b/ci95
ESCS	37.52*** [37.09, 37.95]	37.35*** [36.93, 37.78]
Changes in school segregation	**-0.86***** [-1.12, -0.61]	**-0.88***** [-1.14, -0.63]
Changes in school segregation × ESCS		**0.59*** [0.41, 0.78]
Constant	6.25*** [5.64, 6.86]	6.27*** [5.66, 6.88]
N students	1 068 472	1 068 472
N schools	41 716	41 716
N countries	35	35
N waves	5	5

Note: Being foreign-born, having a foreign-born mother, or having a foreign-born father at the individual level were controlled for all models, as were changes in the ESCS mean and standard deviation at the country level. 95% confidence intervals in parentheses. * p<0.05, ** p<0.01, *** p<0.001.
Source: OECD: 2000–12 PISA database.

6.6.4 Who wins and who loses?

Evidently, a decrease in socioeconomic segregation is associated with the decreasing influence of family background. The question then is how does this come about? Do socioeconomically disadvantaged students improve at the expense of better-off students? To answer this question, estimations of how changes in the socioeconomic segregation of schools affect students at the 90th, 75th, 50th, 25th, and 10th percentiles of the ESCS distribution within the respective countries were made, as shown in Figure 6.2. The figure reveals that changes in socioeconomic segregation between schools had the greatest impact on socioeconomically disadvantaged students. For students at the 10th percentile of the ESCS distribution, whether they lived in a country that experienced the highest *increase* in socioeconomic segregation compared with a country that experienced the highest *decrease* in socioeconomic segregation made a difference of 25 points in the PISA reading test. This difference was statistically significant, corresponding to progress made during more than half of a school year. The effect was about half of that size for students at the median of the ESCS distribution. For students at the 90th percentile of the ESCS distribution, the effect was close to zero and statistically non-significant for both reading and mathematics: high-ESCS students performed well regardless of whether or not the education system became more integrated.[17]

Figure 6.2: Changes in the socioeconomic segregation of schools and in reading scores by ESCS percentiles



However, is there a trade-off between high- and low-performing students? I tested this using the percentage of students at the highest and the lowest performance levels as dependent

[17] The results were robust when changes in educational expenditure or student–teacher ratios were controlled for (see Table A6.7 in the appendix).

variables. The results revealed that on average, a country had about 7–8% of top performers who were able to apply their knowledge to new situations and reflect on their solutions and opinions, and about 18% of low performers who were unable to summarize the main ideas of a text. When the segregation of schools increased in a country, the percentage change in top performers was found to be close to zero, whereas the percentage of low performers increased (see Table A6.6 in the appendix). To conclude, the results show that reduced socioeconomic segregation between schools is not harmful for either socioeconomically advantaged or high-performing students, whereas socioeconomically disadvantaged and low-performing students benefit from this reduction.

6.7 Discussion and conclusion

This chapter has made a conceptual and methodological contribution to the debate on whether a differentiated education system harms socioeconomically disadvantaged students, but benefits socioeconomically advantaged students. The conceptual contribution entailed the use of a broadened concept of differentiation that encompassed not only formal differentiation but also more hidden forms of differentiation. Even in comprehensive education systems, schools can differ in terms of quality, and middle- and upper-class parents may find ways of differentiating their children from others. To capture not just formal but also hidden differentiation, I measured socioeconomic segregation between schools defined as the amount of ESCS variance between schools.

Methodologically, my analysis, which focused exclusively on changes *within* countries over time, makes a contribution to the literature. The advantage of this approach is that unobserved country factors such as ethnic diversity, socioeconomic cleavages, or cultural values do not influence the results on the effects of socioeconomic segregation on student performance to the extent that the unobserved factors are time-constant. This is an advantage over comparative studies that have focused on institutional variation between countries.

Using five waves of PISA data from 2000 to 2012, I demonstrate that when an education system becomes more socioeconomically inclusive, this is beneficial for students from socioeconomically disadvantaged families and decreases the percentage of students with poor skills. At the same time, students from better-off families are not affected by changes in socioeconomic segregation. They perform well anywhere independently of whether or not they attend schools with students from socioeconomically disadvantaged families. Moreover, a country's proportion of top performers was found to be unaffected by changes in socioeconomic segregation between schools. The findings indicate that there is no trade-off resulting from efforts to promote enhanced performance within different groups of students. Instead, improving equality of opportunity, for example, by making schools more socioeconomically inclusive, was found to promote a higher average performance level without harming high-performing students.

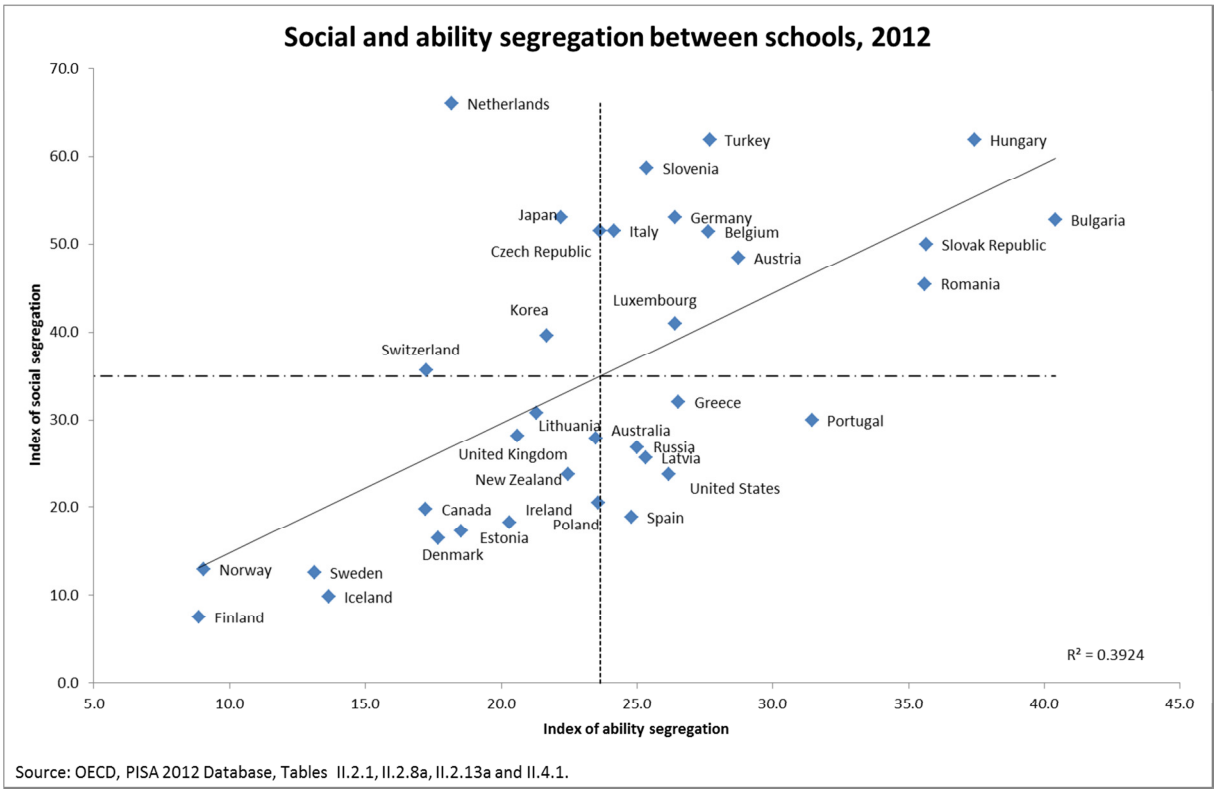
One limitation of the analyses was that I was unable to identify the mechanisms behind the findings. Exploring why students from socioeconomically advantaged families perform well,

relatively independently of the school system's socioeconomic segregation would be a worthwhile topic to explore in the future. Another shortcoming of my study is that I only considered differentiation *between* schools and not differentiation *within* schools.

To conclude, contrary to the belief that prevails among many middle- and upper-class parents, school systems in which students from different socioeconomic backgrounds learn together in the same schools do not harm middle- and upper-class children. These children perform well everywhere, independently of how socioeconomically inclusive the education system is. By contrast, socioeconomically disadvantaged students improve their reading and mathematics performance when school systems—tracked or comprehensive—become more socioeconomically inclusive. Thus, in tracked as well as comprehensive school systems the provision of equal opportunities by ensuring that schools do not become segregated by socioeconomic background, thereby trapping disadvantaged students within disadvantaged schools, remains a challenge. One of the main tasks required in this endeavor may well entail continuing efforts to persuade middle- and upper-class parents that socioeconomically inclusive education systems will not harm their children. This study represents one such effort.

6.8 Appendix

Figure A6.1



Source: OECD, PISA 2012 Database, Tables II.2.1, II.2.8a, II.2.13a and II.4.1.

Figure A6.2

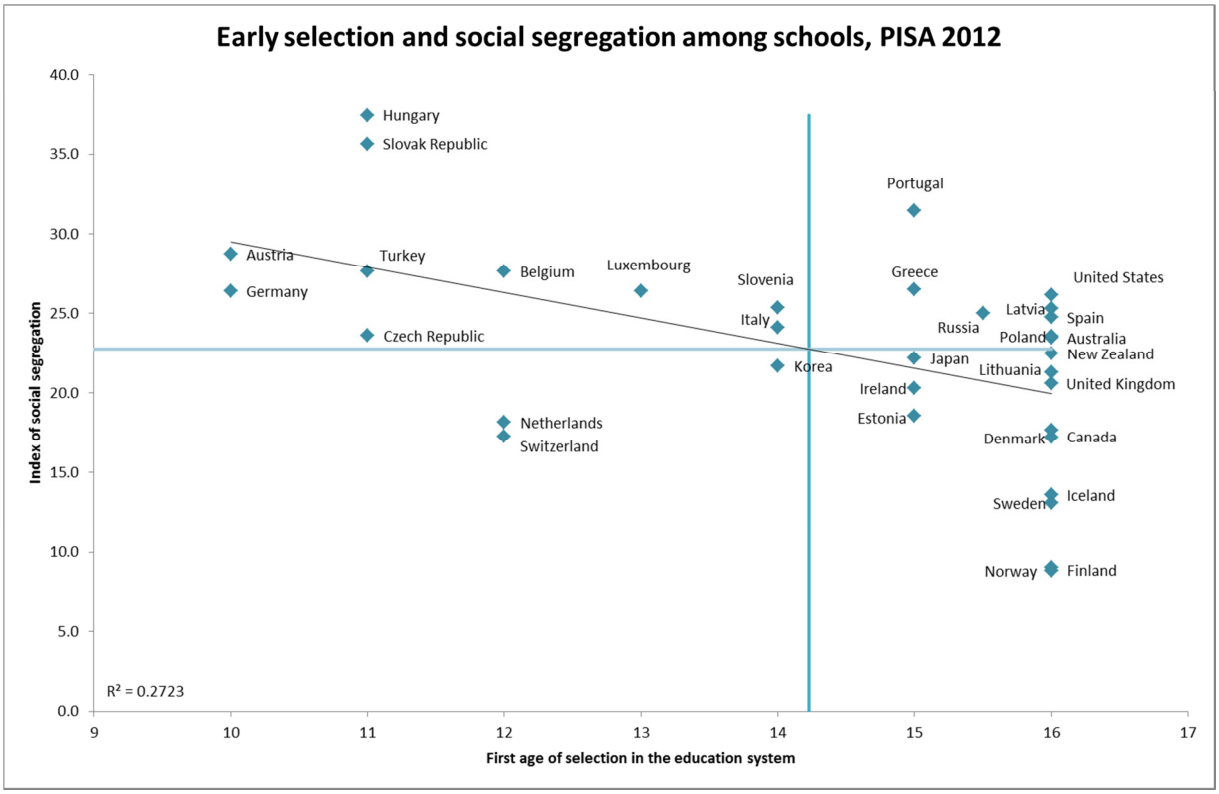


Table A6.1: Between-school variance in ESCS by country and year

	Proportion of between-school-variance in ESCS					Changes in the proportion of between-school variance in ESCS: Deviation from country mean				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
TUR		40.7	28.8	32.5	28.4		7.5	-4.4	-0.8	-4.9
POL	31.4	20.6	21.6	18.4	24.2	8.1	-2.6	-1.6	-4.8	0.9
JPN		28.6	24.8	22.3	22.2		3.3	-0.5	-3	-3.1
ESP	31.0	26.9	29.1	28.1	25.0	2.1	-1.9	0.3	-0.7	-3.8
NLD		22.6	23.5	24.2	18.2		-0.8	0.1	0.8	-5.2
CHE	22.2	24.1	18.8	18.2	17.9	1.4	3.3	-2	-2.5	-2.9
FIN	12.3	10.7	9.7	10.5	9.1	1.5	-0.1	-1.1	-0.3	-1.7
KOR	24.7	29.6	24.3	25.4	21.7	-1.2	3.7	-1.6	-0.5	-4.2
AUS	26.5	24.5	21.6	22.8	23.7	2.6	0.7	-2.2	-1	-0.2
LTU			24.2	23.1	21.6			0.5	-0.6	-2.1
HUN	41.1	42.9	38.0	39.4	38.6	0.7	2.5	-2.3	-1	-1.8
CZE	25.8	25.8	22.1	20.1	24.0	2.3	2.4	-1.4	-3.4	0.5
ITA	25.9	29.6	23.2	26.2	24.8	-0.3	3.5	-3	0.1	-1.4

CAN	18.2	18.9	19.6	19.1	17.8	-0.8	-0.1	0.7	0.1	-1.2
ISL	15.1	15.8	13.7	13.9	14.8	0.6	1.2	-0.9	-0.7	0.2
NOR	9.5	10.4	11.0	7.5	9.2	-0.1	0.8	1.4	-2.1	-0.4
SVN			25.8	28.1	26.3			-1.1	1.2	-0.6
DEU	26.0	30.8	23.5	23.8	26.6	-0.1	4.7	-2.5	-2.3	0.5
GBR			19.8	20.4	20.6			-0.3	0.3	0.6
EST			18.1	16.5	19.1			0.6	-0.9	1.7
USA	24.8	23.2	26.6	30.4	26.5	-1.5	-3.2	0.3	4	0.2
GRC	25.4	30.7	28.4	24.6	27.1	-1.8	3.5	1.2	-2.5	-0.1
SWE	12.0	10.8	12.5	13.9	13.8	-0.3	-1.6	0.2	1.5	1.5
FRA	25.1	29.1	30.0	29.4	28.0	-3.3	0.7	1.6	1	-0.4
LUX		23.7	22.8	22.8	26.8		0.6	-0.2	-0.3	3.7
IRL	16.2	18.6	19.4	20.8	20.3	-2.5	-0.1	0.7	2.1	1.6
BEL	23.3	29.2	25.4	28.8	28.1	-3.4	2.5	-1.3	2.1	1.4
DNK	13.0	17.3	12.3	15.9	17.8	-1.7	2.6	-2.3	1.3	3.2
NZL	17.3	15.7	16.1	19.5	22.4	0.1	-1.5	-1.1	2.3	5.2
SVK		30.3	31.0	24.0	36.1		1.8	2.4	-4.6	7.5

ROU	30.1		31.6	25.8	35.9	0.5		2	-3.8	6.3
AUT	23.6	29.4	29.1		29.6	-4	1.8	1.4		2
PRT	23.8	23.6	29.7	28.1	31.6	-2.5	-2.7	3.5	1.9	5.4
BGR	31.6		41.1	32.9	40.7	-3.6		5.9	-2.2	5.5
LVA	13.5	18.0	20.2	23.6	25.7	-5.1	-0.5	1.7	5.1	7.1

Source: OECS PISA database 2000-2012

Figure A6.3: Development of proportion of between-school variance in ESCS in PISA 2000-2012

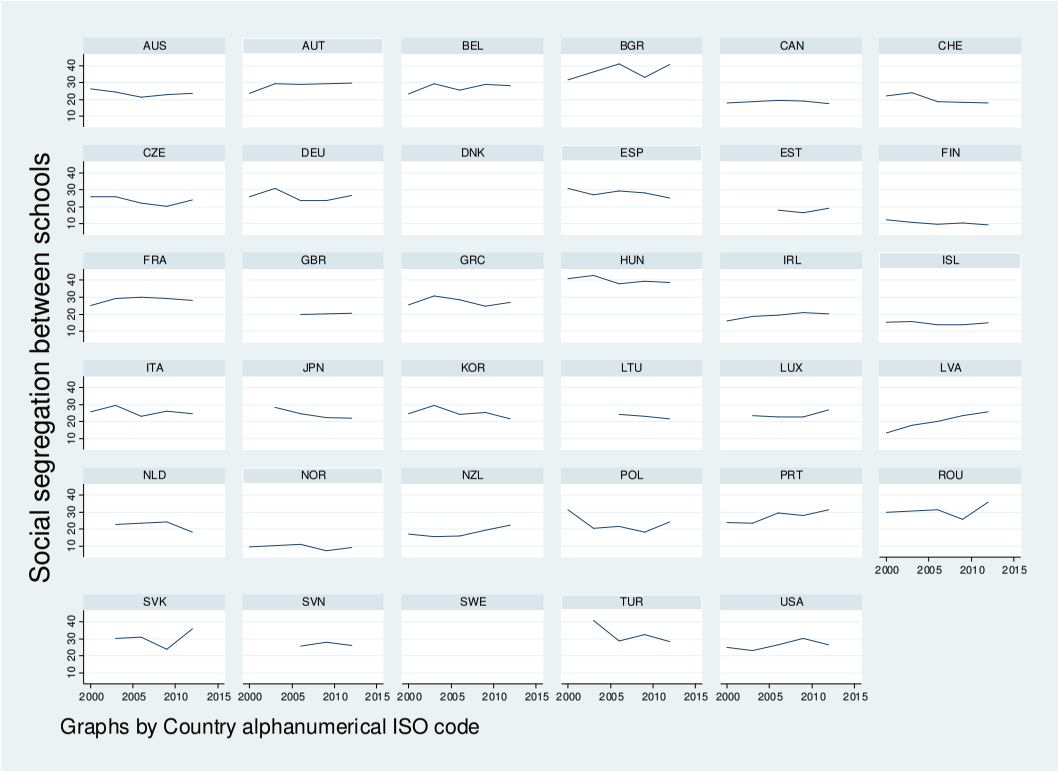
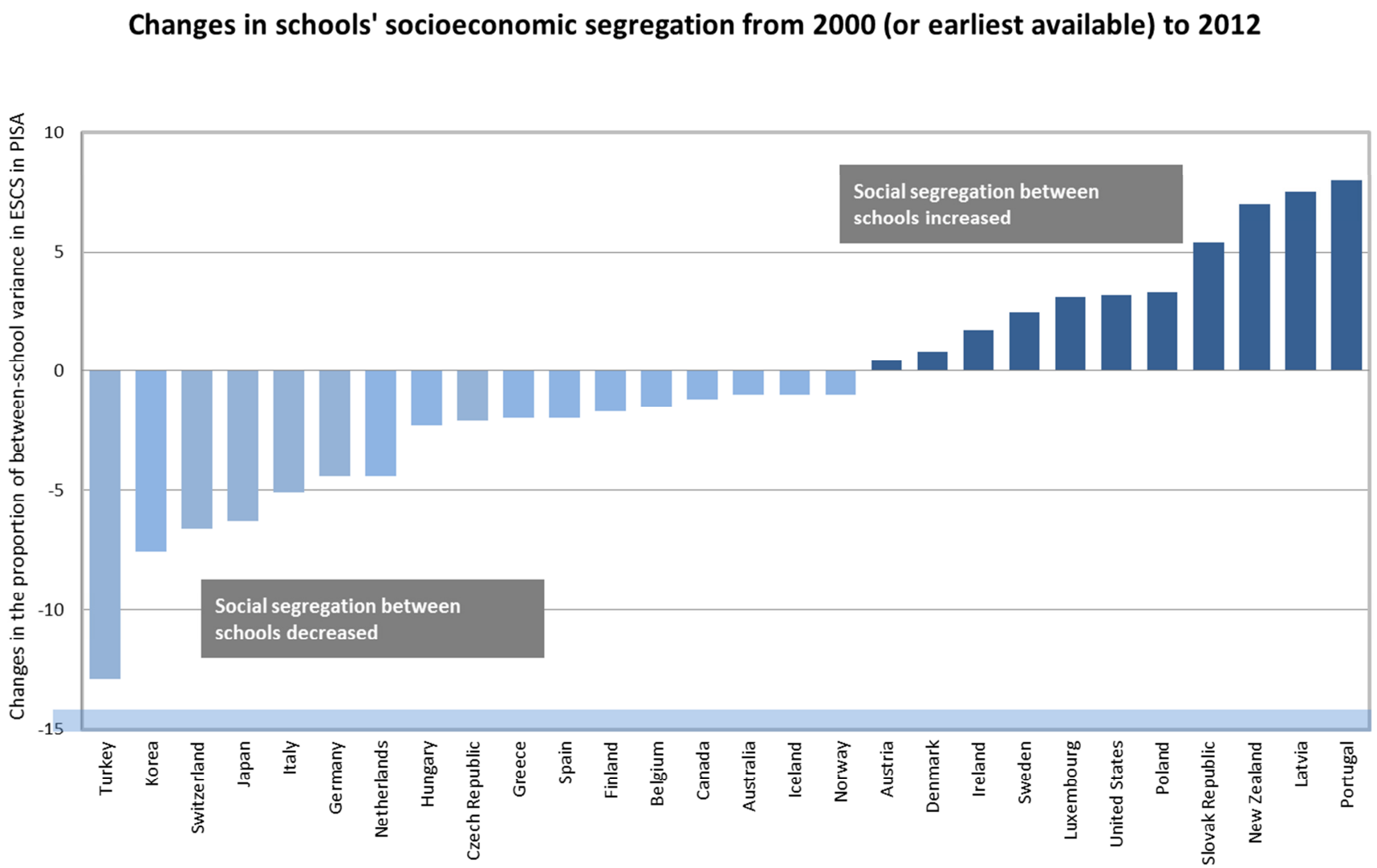
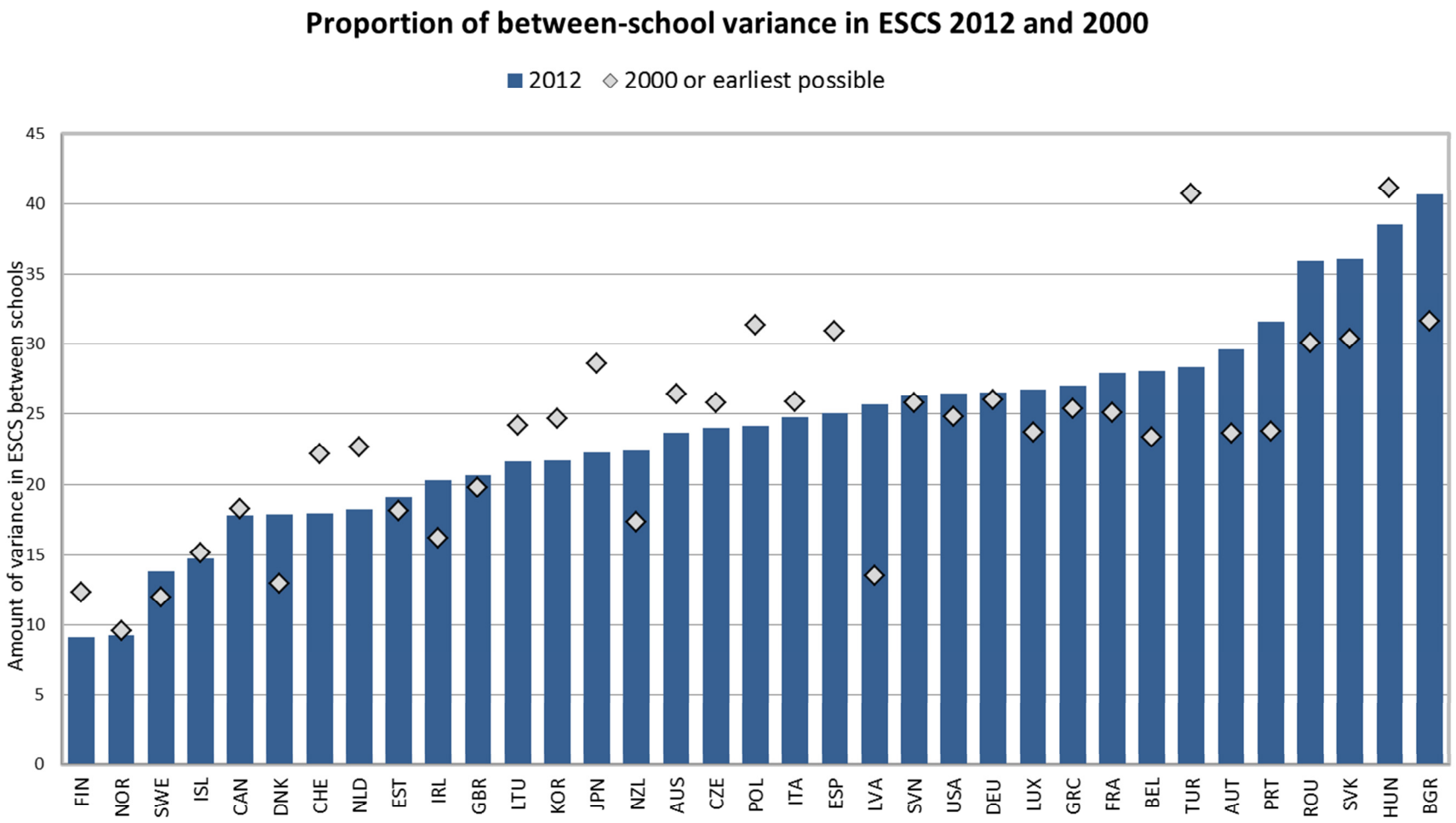


Figure A6.4



Source: OECD: PISA database 2000-2012

Figure A6.5



Source: OECD: PISA database 2000-2012

Table A6.2: Mean score and percentage of top- and low-performers in reading by country and wave

	Mean score in reading					% Top-performers: Students on the highest competence levels 5 and 6 in reading					% Low-performers: Students below proficiency level 2 in reading				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
AUS	528	525	513	515	512	17.1	12.6	9	12	10.8	12.3	10.6	12.4	13.5	13.6
AUT	507	491	490		490	8.3	6.4	8		4.4	13.8	19.8	20.8		19
BEL	507	507	501	506	509	11.1	9.9	9.5	10.1	10.8	18.9	16.5	18.9	17.3	15.2
BGR	430		402	429	436	1.6		1.4	2.1	3.7	40.1		50.6	40.5	39.1
CAN	534	528	527	524	523	15.8	10.3	12.9	11.7	11.6	9.1	8.3	10.1	9.8	10
CHE	494	499	499	501	509	8.6	5.6	6.8	7.3	7.8	20	15.4	15.6	16.1	12.9
CZE	492	489	483	478	493	6.2	4.9	7.8	4.5	5.1	16.6	17.4	24.5	22.4	15.8
DEU	484	491	495	497	508	8.1	7.5	8.6	6.9	8	22.1	21.7	19.4	17.8	14.2
DNK	497	492	494	495	496	7.1	3.1	5	3.5	4.6	17.1	14.5	14.8	14.6	13.8
ESP	493	481	461	481	488	3.1	2.6	1.2	2.6	4.5	15.8	19.3	25	18.9	17.4
EST			501	501	516			4.9	5.2	7.1			12.9	12.5	8.4
FIN	546	543	547	536	524	17.6	11.4	14.9	13.2	11.6	6.4	5	3.9	7.5	10.8
FRA	505	496	488	496	505	7.5	5.1	5.2	8.8	11.5	14.7	16.3	21.2	19.6	18.1

GBR			495	494	499			7.8	7.3	8.1			18	17.8	15.9
GRC	474	472	460	483	477	4	3	2.2	4.2	3.4	24.1	22.9	27.1	20.7	21.5
HUN	480	482	482	494	488	4	3	3.6	5.2	4.3	22.6	19.1	20	17.1	19.3
IRL	527	515	517	496	523	13.6	7.2	10.3	6	10.3	10.6	10	11.2	16.5	8.9
ISL	507	492	484	500	483	8	5.2	4.5	7.5	4.3	14.2	16.7	19.3	16.3	20.1
ITA	487	476	469	486	490	4.5	3.5	4.3	4.8	5.5	18.1	22.3	25.8	20.5	18.7
JPN	522	498	498	520	538	8.4	7	7.6	12.2	17.1	10	17.9	17.5	13	9.1
KOR	525	534	556	539	536	3.9	9.5	20.7	11.6	12.6	5.1	5.6	5.3	5.4	7.2
LTU			470	468	477			3.4	2.3	2.3			25.1	23.7	20.1
LUX		479	479	472	488		3.6	4.2	4.7	7.5		21.1	22	25.5	21.4
LVA	458	491	479	484	489	3.7	3.9	3.1	2.2	3.1	29.1	16.3	19.9	16.8	16.5
NLD		513	507	508	511		7	7.9	8.9	8.9		10.2	14.4	13.3	13.3
NOR	505	500	484	503	504	10.6	7.7	6.3	7.4	9	17.1	16.6	21.3	14.7	14.9
NZL	529	522	521	521	512	17.9	15.2	14.6	15.1	12.9	13.6	13.5	13.7	13.7	15.4
POL	479	497	508	500	518	4.9	6.1	9.9	6.2	8.5	23	15.1	15.2	14.3	9.7
PRT	470	478	472	489	488	3.3	2.3	3.7	3.9	4.6	25.6	21.3	24.1	17	18.1
ROU	428		396	424	438	1.7		0.1	0.4	1	41.2		53.8	40.4	36.9

SVK		469	466	477	463		2.1	4.2	3.4	3.5		22.8	27	22	27.9
SVN			494	483	481			4.6	3.8	4			16.4	20.4	20.5
SWE	516	514	507	497	483	10.4	9.6	9.6	8.2	6.8	12	11.7	14	16.8	22
TUR		441	447	464	475		3.3	1.2	1.2	3.7		35.9	31.2	23.6	20.7
USA	504	495		500	498	11.2	7.5		9.2	7	17.2	18.5		17.3	15.9
average	497	497	488	493	496	8.2	6.4	6.7	6.6	7.1	18.2	16.6	20.4	18.2	17.2

Source: OECS PISA database 2000-2012

Table A6.3: Mean and standard deviation of ESCS by country and wave

	Mean ESCS					Standard deviation of ESCS				
	2000	**2003**	**2006**	**2009**	**2012**	**2000**	**2003**	**2006**	**2009**	**2012**
AUS	-0.02	0.04	0.22	0.27	0.25	0.79	0.88	0.73	0.68	0.79
AUT	-0.21	-0.26	0.03		0.08	0.85	0.86	0.8		0.85
BEL	-0.21	-0.03	0.07	0.16	0.15	0.88	1.01	0.86	0.85	0.91
BGR	-0.43		-0.47	-0.26	-0.28	0.88		1	0.94	1.05
CAN	0.18	0.21	0.3	0.44	0.41	0.9	0.93	0.79	0.78	0.86
CHE	-0.17	-0.23	0.02	0.13	0.17	0.96	1.02	0.88	0.85	0.89

CZE	-0.46	-0.05	-0.11	-0.07	-0.07	0.76	0.87	0.73	0.67	0.75
DEU	-0.01	0.01	0.19	0.2	0.19	0.9	1.08	0.89	0.85	0.93
DNK	0.18	0.08	0.45	0.45	0.43	0.89	0.98	0.8	0.77	0.84
ESP	-0.74	-0.51	-0.46	-0.21	-0.19	1.14	1.15	1.02	1.01	1.03
EST			-0.13	0.1	0.11			0.78	0.74	0.81
FIN	-0.18	0.06	0.19	0.39	0.36	0.92	0.97	0.76	0.72	0.77
FRA	-0.42	-0.32	-0.28	-0.14	-0.04	0.83	0.96	0.79	0.77	0.8
GBR			0.13	0.25	0.27			0.75	0.75	0.8
GRC	-0.36	-0.3	-0.22	-0.03	-0.06	0.98	1.04	0.92	0.91	1
HUN	-0.49	-0.31	-0.26	-0.16	-0.25	0.87	0.95	0.84	0.87	0.96
IRL	-0.33	-0.26	-0.06	0.08	0.13	0.91	0.93	0.8	0.8	0.85
ISL	0.24	0.55	0.61	0.72	0.78	0.91	0.93	0.83	0.78	0.81
ITA	-0.33	-0.29	-0.19	-0.03	-0.05	0.94	1.08	0.9	0.92	0.97
JPN		-0.42	-0.16	-0.07	-0.07		0.8	0.67	0.66	0.71
KOR	-0.57	-0.36	-0.16	-0.01	0.01	0.82	0.94	0.77	0.72	0.74
LTU			-0.26	-0.22	-0.13			0.85	0.84	0.92
LUX		-0.09	0	0.17	0.07		1.07	1.05	1.02	1.1

LVA	-0.61	-0.34	-0.44	-0.28	-0.26	0.81	0.88	0.79	0.79	0.89
NLD		-0.08	0.16	0.13	0.23		0.97	0.82	0.73	0.78
NOR	0.21	0.19	0.35	0.58	0.46	0.8	0.79	0.7	0.65	0.76
NZL	-0.07	-0.13	0.11	0.15	0.04	0.79	0.9	0.79	0.74	0.82
POL	-0.62	-0.41	-0.57	-0.3	-0.21	0.84	0.92	0.83	0.81	0.9
PRT	-0.81	-0.91	-0.8	-0.45	-0.48	1.11	1.34	1.24	1.13	1.19
ROU	-1.05		-0.69	-0.48	-0.47	1.08		0.88	0.8	0.94
SVK		-0.25	-0.18	-0.1	-0.18		0.94	0.84	0.76	0.92
SVN			-0.22	0.06	0.07			0.82	0.82	0.87
SWE	0.15	0.08	0.26	0.39	0.28	0.82	0.98	0.79	0.78	0.82
TUR		-1.15	-1.32	-1.14	-1.46		1.05	0.91	0.94	1.1
USA	0.07	0.05	0.2	0.24	0.17	0.87	0.98	0.87	0.88	0.97

Source: OECS PISA database 2000-2012

Table A6.4: ESCS percentiles, overall and within countries

	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
overall	-1.3	-0.9	-0.1	0.6	1.2
within countries (deviation from country mean)	-1.1	-0.6	0.0	0.7	1.2

Table A6.5: Changes in reading and mathematics test scores in PISA and changes in an education system's school segregation, country fixed-effects models

	Changes in reading 2000-2012		**Changes in mathematics 2003-2012**	
	M1 b/ci95	M2 b/ci95	M1 b/ci95	M2 b/ci95
ESCS	37.52*** [37.09,37.95]	37.35*** [36.93,37.78]	38.82*** [38.36,39.29]	38.63*** [38.17,39.08]
Changes in school segregation	**-0.86***** [-1.12,-0.61]	**-0.88***** [-1.14,-0.63]	**-0.30*** [-0.56,-0.05]	**-0.34**** [-0.59,-0.09]
Changes in school segregation x escs		**0.59***** [0.41,0.78]		**0.47***** [0.27,0.67]
_cons	6.25*** [5.64,6.86]	6.27*** [5.66,6.88]	3.80*** [3.08,4.52]	3.82*** [3.10,4.54]
N students	1068472	1068472	935228	935228
N schools	41716	41716	36459	36459
N countries	35	35	35	35
N waves	5	5	4	4

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level and changes in the mean and the standard deviation of the ESCS at the country level.
Source: OECD: 2000-2012 PISA database

Table A6.6: Changes in schools' socioeconomic segregation and changes in the percentage of top and low performers

	Changes in % top performers (proficiency levels 5+6)		Changes in % low performers (below proficiency level 2)	
	M1	M2	M1	M2
	b/ci95	b/ci95	b/ci95	b/ci95
ESCS	5.20***	5.23***	-10.05***	-9.97***
	[5.09,5.32]	[5.11,5.34]	[-10.22,-9.89]	[-10.13,-9.80]
Changes in school segregation	**-0.09*** **	**-0.09*** **	**0.27*** **	**0.28*** **
	[-0.14,-0.05]	[-0.14,-0.05]	[0.17,0.37]	[0.18,0.38]
Changes in school segregation x escs		**-0.08** **		**-0.32*** **
		[-0.13,-0.02]		[-0.39,-0.25]
_cons	0.34***	0.34***	-1.84***	-1.85***
	[0.23,0.46]	[0.23,0.46]	[-2.07,-1.62]	[-2.08,-1.63]
N students	1068472	1068472	1068472	1068472
N schools	41716	41716	41716	41716
N countries	35	35	35	35
N waves	5	5	5	5

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level; and changes in the mean and the standard deviation of the ESCS at the country level.
Source: OECD: 2000-2012 PISA database

The effect on top-performers is statistically significant but very close to zero (and negative if anything). With each percentage point increase in schools' socioeconomic segregation, the percentage of top-performers decreases by 0.01 percentage points. As schools' socioeconomic segregation maximally changes by less than 10%, the maximum change is less than 0.1 percentage points. The effect on low-performers, on the other hand, is more substantial with a change of 3 percentage points for the maximum change in schools' socioeconomic segregation.

Table A6.7: The influence of changes in socioeconomic segregation on changes in reading scores and on ESCS is robust when controlling for changes in educational expenditure or student-teacher-ratios

	Changes in reading 2000-2012 M1 b/ci95	**Changes in reading 2000-2012** M1 b/ci95
ESCS	37.02***	37.02***
	[36.53,37.51]	[36.53,37.51]
Changes in school segregation	-0.87***	-0.91***
	[-1.17,-0.57]	[-1.20,-0.62]
Changes in school segregation x escs	0.72***	0.58***
	[0.51,0.93]	[0.37,0.79]
Changes in educational expenditure	-0.00~	
	[-0.00,0.00]	
Changes in student-teacher-ratios		-0.62
		[-1.47,0.23]
_cons	6.50***	6.10***
	[5.78,7.22]	[5.42,6.79]
N	699203	769004

Note: all models are controlled for being foreign-born, having a foreign-born mom, and having a foreign-born dad at the individual level; and changes in the mean and the standard deviation of the ESCS at the country level.

Sources: OECD: 2000-2012 PISA database, Eurostat (2015): Education and Training for annual expenditure on public and private educational institutions per student in PPS, for all levels of education combined and student-teacher ratio and average class size (ISCED 1-3).

7. Concluding remarks: Do we place too much faith in schools, while underestimating families?

7.1 Introduction and research questions

The conviction that all children should have equal opportunities to succeed in education, regardless of their families' socioeconomic backgrounds, is widely held. Nonetheless, international student assessment programs such as the PISA, TIMSS, and PIRLS study have repeatedly drawn attention to the importance of family background as a determinant of students' cognitive competencies. In countries where students performed poorly in reading and mathematics and their performance was more strongly related to their family background than in other countries, the response of many parents and policymakers has been to call for school reforms. International data programs that assess students' competencies in areas such as reading and mathematics enable students' performance and levels of inequality of educational opportunities to be compared across countries. However, they do not directly indicate how students' performance and educational opportunities can be improved. To address this question, I investigated how schools, interacting with families, shape educational inequalities. On the one hand, schools could serve as equalizers, providing a common learning experience for all students independently of their family backgrounds (Mann, 1848). On the other hand, inequalities between schools could contribute to inequalities in educational opportunities, because students from disadvantaged families generally attend disadvantaged schools in terms of facilities, teachers, and peers. In this study, I investigated whether schools are better able to improve educational opportunities for socioeconomically disadvantaged students when they are integrated along socioeconomic lines.

According to the law in Europe, the English-speaking world, and beyond, all children have the right to education. Consequently, Mann (1848) viewed schools as the foundation for establishing equality of educational opportunities. Learning opportunities in schools could partly compensate for a lack of cognitive stimulation at home. For example, schools can open up the worlds of literature, music, and science for their students, especially for those who are not surrounded by books, do not learn an instrument during the afternoons, and do not play with science kits at home (see Figure 7.1).

Figure 7.1: Schools opening up the worlds of literature, music, and science[18]

However, the expectation that schools can serve as equalizers may be unrealistic, because advantaged students attend advantaged schools in terms of facilities, teachers, and peers, while disadvantaged students attend disadvantaged schools (Alexander, 2016; DiPrete & Eirich, 2006; Gamoran & Berends, 1987; Maaz et al., 2008; Oakes, 1985). Therefore, schools may not provide a common learning experience for all students. Instead, they may reproduce or even amplify inequality. Thus, instead of opening up new worlds, schools attended by children from different socioeconomic backgrounds could constitute separate worlds. In a nutshell, schools could actually serve as stratifiers rather than as equalizers.

My contribution to this discussion centers on my attempt to address the question of whether the capacities of schools to compensate for students' disadvantaged family conditions are greater when students from different socioeconomic backgrounds attend the same schools and, conversely, whether they are weaker when these students attend schools segregated along socioeconomic lines. To answer this question, I investigated whether schools' capacities to equalize students' performance vary across countries and change over time. I compared the effects of schooling on students' achievements in the United States to those of schooling in Finland. Finland has the lowest degree of socioeconomic segregation between schools among the OECD countries, whereas in the United States, schools are evidently segregated by socioeconomic background.

In addition to examining variations across countries, I investigated changes over time. Specifically, I assessed whether socioeconomically disadvantaged students benefit when an education system becomes more socioeconomically integrated and what this means for students from better-off families. Many middle and upper class parents believe that their children will learn less in schools that are attended by students from lower socioeconomic

[18] Illustration by Paul Zwolak.

backgrounds. They fear that in comparison to segregated schools where students all share a higher SES, the lessons delivered by teachers in socioeconomically integrated schools could be less challenging and students of lower SES could be less ambitious. This raises the question of whether there is a trade-off between academic excellence and equality of opportunity in education. Do socioeconomically disadvantaged children benefit, while more advantaged students suffer in socioeconomically integrated school systems?

Whereas international student assessment programs have fueled debates about school reforms and different education systems in several countries, they may have directed the focus of attention away from the more fundamental problem relating to education inequality, which is socioeconomic inequality existing between families (Berliner, 2013; Merry, 2013; Solga, 2012, 2014). For example, studies comparing learning during the summer and during the school year have shown that the widening of SES achievement gaps occurs mainly during the summer when schools are closed (Alexander et al., 2007; Downey et al., 2004; Heyns, 1978). It is possible that the effects of schools and education systems have been overstated by a number of scholars, because their research designs were incapable of separating the effects of schools and education systems from the effects of families on educational achievements. Therefore, I paid special attention to this problem in developing my own research design.

A lack of investigation of *when* educational inequalities develop could also result in overstating the effects of schools and education systems. For example, SES achievement gaps could already be present before children have even entered school (Bradbury et al., 2015a; Heckman, 2006; Merry, 2013). This could indicate that schools only have limited impacts on educational inequality. Instead, SES achievement gaps at the stage of school entry could be the outcome of inherited IQ differences (Herrnstein & Murray, 1994; Marks, 2014) or of early childhood development (Heckman, 2006; Waldfogel, 2004).

I have contributed to these debates in this thesis by addressing the following questions. What is the role of schools in the creation of educational inequalities in interaction with families and children's competencies at school entry? Can integrated schools and education systems compensate for a disadvantaged family environment? Alternatively, are inequalities in families' resources and behaviors, or already existing achievement gaps at school entry, the main reasons for inequality in educational achievements?

In the following section, I will briefly summarize the main findings of this study. Subsequently, I will discuss some of its shortcomings, offer ideas for future research, and discuss the policy implications of the findings.

7.2 Findings, contributions and arguments

7.2.1 Low-SES children do not simply lack competencies at school entry

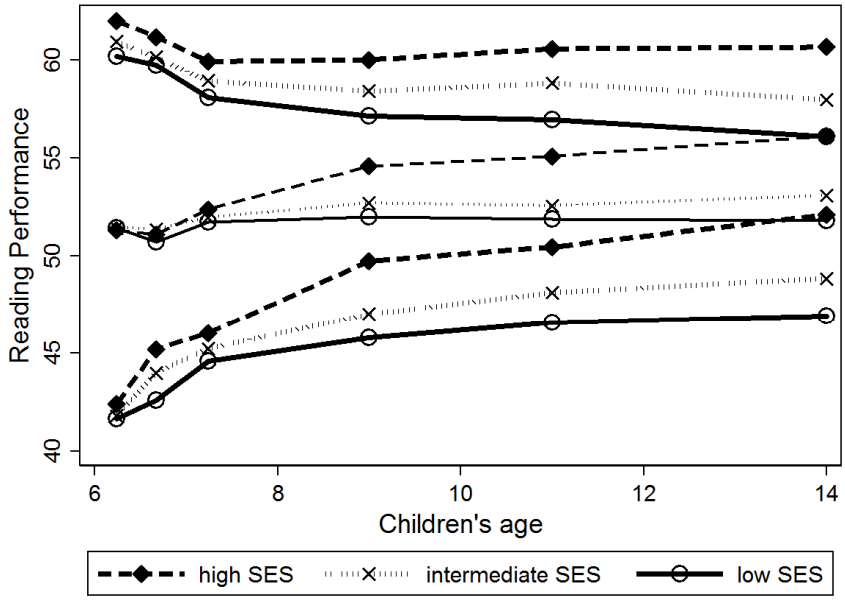
Do low-SES children lack competencies before they have even entered school? This would indicate that schools only have a limited impact on the development of achievement gaps. There could be two reasons for this. First, achievement gaps may have already developed in

early childhood and remain relatively unchanged thereafter (Bradbury et al., 2011; Merry, 2013). Second, achievement gaps may be largely the outcome of inherited differences and may not be attributable to family or school conditions (Herrnstein & Murray, 1994; Marks, 2014). Herrnstein and Murray (1994, p. 27) claim that a "new class structure emerged, in which it became more consistently and universally advantageous to be smart." Therefore, they are convinced that intelligent children will make it to the ranks of the "cognitive elite," even if they come from low socioeconomic backgrounds.

To answer the question of when SES gaps develop, I analyzed children's cognitive development over the course of their schooling from the ages of 5 to 14 years in the United States. My analysis of the data from the ECLS-K: 1999 study revealed that even before school entry, many low-SES children were already lagging behind their peers in terms of their cognitive skills (Bradbury et al., 2015a; Feinstein, 2003; Waldfogel, 2004). Thus, SES achievement gaps are already significant before schooling even begins.

To investigate how achievement gaps develop over the years of schooling, I compared the competence development of children who entered school with similar competence levels of (pre)reading and mathematics, but who come from different family backgrounds. This comparison ruled out the possibility that students developed differently not because of family and school conditions, but because they had different "innate abilities" or because their capacities to benefit from learning opportunities provided in school differed. Figure 7.2 reveals that over the course of their schooling, low-SES children are left behind whereas high-SES students catch up. Thus, the titles coined for the last two major education acts in the United States, namely "No Child Is Left Behind" and "Every Student Succeeds," do not reflect the reality.

Figure 7.2: Reading development by parents' SES



Source: ECLS-K 1999

Against these beliefs, my findings indicated that even initially high-performing children from disadvantaged families fall behind their initially similarly performing but advantaged peers. Children with high early test scores have proven that they have the ability to do well. Therefore, this finding contradicts the views of those who hold that many low-SES children do not have the potential to do well in school, or that educational inequalities have genetic causes.

Instead, the finding that even bright children from disadvantaged families fall behind their peers from better-off families supports the notion that family or school environments play an important role in influencing how children's cognitive competencies develop. Moreover, the finding that low-performing children from socioeconomically advantaged families catch up over time supports the notion that cognitive development is not fixed. Consequently, students' low cognitive abilities at school entry do not necessarily mean that they will perform at a low level throughout their schooling. Rather, the findings of my study point not to unequal abilities but to unequal family and school conditions as an explanation for differential cognitive development.

The findings also hold when regression to the mean is accounted for. In accordance with the findings of Jerrim and Vignoles (2013), it was necessary to account for regression to the mean when considering children's early test scores. As observed by these authors, students with high early test scores and those with low early test scores will move toward the mean at the next measurement. This is because both groups include disproportionate numbers of students with either a positive or a negative random component, respectively. As this component is random, test scores will move toward the mean. If this phenomenon did not manifest differently for high- and low-SES students, assessing the development of SES achievement gaps would not pose a problem. However, the group means of these students have been found to differ and the further they move away from the group mean, the stronger the regression to the mean. Therefore, Jerrim and Vignoles (2013) argue that disadvantaged students are not left behind over the course of their schooling and that this finding is just a statistical artefact. It is apparent that many studies within the literature do not account for regression to the mean (Blanden et al., 2012; Feinstein, 2003; Schoon, 2006). However, the finding that low-SES children fall behind holds even when regression to the mean is controlled for.

The finding that low-SES students are left behind their initially similarly performing peers from better-off families is remarkable, because selection works in the reverse direction. High-performing children from socioeconomically disadvantaged families may perform well for several reasons. They may be especially bright or have parents who support them well, or they may have attended good preschools. Therefore, it is surprising that they fall behind. At the same time, low-performing children from high-SES families are negatively selected. They may not perform well because their parents do not spend a lot of time with them or because the students concerned are not very bright. Consequently, it is surprising that these children catch up from the bottom tercile of the performance distribution to reach the average level from primary to middle school (Figure 7.2).

7.2.2 Families or schools?

If children's abilities do not explain why low-SES children are left behind, the question of whether this phenomenon is due to families or to schools requires a response. Specifically, do low-SES children fall behind because they attend schools of lower quality than those attended by high-SES children, or because they are raised in disadvantageous family conditions? Answering this question is not easy, because it is not clear whether a child performs well in a test because of the high level of support provided by his or her parents, because he/she attends a good school, or both. To separate the effects of families and schooling, I compared what children learned during the summer holidays to what they learned during the school year (Alexander et al., 2001; Alexander et al., 2007; Downey et al., 2004; Heyns, 1978). During the summer holidays, learning is shaped by families (and possibly by other non-school factors such as neighborhoods). By contrast, during the school year, learning is shaped by both families and schools. The comparison of summer learning and school-year learning can thus provide insights on why SES achievement gaps develop between children whose initial performance was similar but whose socioeconomic backgrounds differ.

I contribute to the literature on summer learning and school-year learning by considering children's skills at school entry, parents' activities with their children, and inequalities between schools and education systems in my analysis. Heckman (2006) argues that children's competencies at school entry constitute the foundation for their learning during the course of their schooling. Children who enter school well prepared will be better able to make use of the learning opportunities they encounter at school (Raudenbush & Eschmann, 2015; Sørensen & Morgan, 2000). As high-SES children are on average better readers, the notion that learning begets learning would suggest that SES achievement gaps grow over time. To rule out this explanation, I compared students with similar initial abilities.

My analysis revealed that SES achievement gaps among children whose initial performance was similar grew mostly during the school year and less during the summer holidays. This finding indicates that low-SES children with similar initial skills to those of their high-SES peers fall behind because of unequal school conditions. This is further substantiated by the fact that SES achievement gaps widen between children attending different schools but not among those attending the same schools. Thus, the idea that inequalities between schools play a role in explaining why children from socioeconomically disadvantaged families fall behind is backed by the research findings.

How then do these findings mesh with the finding that schools equalize students' performance? Similar to the findings in the literature on summer learning and school-year learning (Alexander et al., 2007; Downey et al., 2004; Heyns, 1978), I found that primary schools accelerated learning, especially for children who entered school with low levels of reading and mathematics skills. Thus, schools evidently equalize performance. Because children from disadvantaged families on average perform worse than children from advantaged families, disadvantaged children benefit more from schooling. Therefore, SES

achievement gaps would be even wider without the influence of schools. However, when I compared just children whose initial performance was similar, the equalizing effect of schools was no longer evident. This result could be attributed to scaling, or there may be substantive reasons for it. Comparing only children whose initial performance was similar alleviated scaling problems such as floor or ceiling effects, because only children similarly situated in the competence distribution were compared. For example, it may be easier for weak students to improve. Because weak students are often students from disadvantaged families, it would be reasonable to conclude that disadvantaged students would catch up over time. Therefore, I compared only children with similar early skill levels. If progress at lower levels of the competence distribution was found to be easier to accomplish, this would be true for all children with low competencies. Thus, scaling could exaggerate the equalizing effect of schooling.

Besides scaling issues, there could be substantive reasons as to why schooling appeared to be less equalizing when students' initial skill levels were considered. I investigated two possible explanations as to why low-SES children are left behind their peers whose initial performance was similar. The first was inequality in school quality and the second was inequalities relating to parents' behavior. Regarding the first possibility, I investigated how the effect of schooling varied depending on school quality. As an indicator for school quality I used the socioeconomic composition of the student body in schools. I found that in schools with a higher average socioeconomic student body composition, students showed greater improvement in reading. This was especially true in the case of low-SES students. The finding was robust even when learning during the summer months was controlled for to account for selection into schools. Thus, the effect of schooling as compared to staying at home was especially marked for low-SES students attending high-quality schools. However, because low-SES students in the United States mainly attend schools with other low-SES students, they fall behind. Accordingly, schools contribute to growing SES gaps among initially similarly performing children.

However, the school-based explanation cannot explain why SES achievement gaps among children whose initial performance was similar mainly grew among low-performing children. This phenomenon was indicative of another mechanism at work, namely compensatory advantage (Bernardi, 2014; Torche, 2016a). To investigate this mechanism, I tested whether parents attempted to compensate for the low performance of their children by giving them extra support. The mechanism of compensatory advantage predicts that high-SES parents are more likely to provide this support and are able to do so more effectively. The findings of my analysis revealed that parents whose children perform poorly at school entry attempt to compensate for this, for example, by supporting their children with homework. I did not find any differences based on parents' SES. However, high-SES parents may be better able to support their children with homework, and they also have more resources to compensate for the low performance of their children. For example, high-SES parents can invest in private tutoring when their children perform poorly. Among low-performing children, about 10% of low-SES children receive private tutoring, whereas the figure for high-SES children is nearly 30%. Thus, processes of compensatory advantage were evidently at work.

7.2.3 Stronger equalizing effect of schooling in integrated education systems

Schools in the United States are highly segregated and differ in their quality. Thus, even though the comparison of summer learning and school-year learning suggests that achievement gaps in this country would grow even more without the influence of schools, the equalizing effect of schooling was found to be weak. In addition, inequalities between schools contribute to the creation of SES achievement gaps over the course of the school year, especially when students whose initial performance was similar are compared. The comparison of learning during the summer holidays to learning during the school year is indicative of the effect of schooling in the US education system. However, it does not reveal to what extent schooling *could* potentially affect inequality if the education system was organized differently. I hypothesized that schooling would have a greater capacity to compensate for a socioeconomically disadvantaged family environment in a country with low segregation between schools and low differences in schools quality. To test this hypothesis, I compared the effect of schooling on educational inequality in the United States and Finland. Finland, which is famous for its egalitarian education system, has the lowest degree of socioeconomic segregation between schools of all of the countries participating in the PISA studies (OECD, 2010b).

However, when comparing the effects of schooling across countries, a factor that needs to be considered is that countries with high levels of inequality between schools also tend to be those with high inequalities between families. It is thus unclear whether inequality in educational opportunities is higher in these countries because there are greater inequalities between families in the first place, or because of their more unequal education systems. Therefore, the effect of education systems and schools is often overestimated in comparative research. For example, the United States not only has very unequal schools, but it is also characterized by a high level of inequality between families and a high child poverty rate. Finland, by contrast, not only has a very egalitarian education system, but Finnish society is also egalitarian and the country is characterized as a generous welfare state with a universal health care system and a low rate of child poverty.

To separate the contributions of families and schools in Finland and the United States, I once again availed of a comparison of summer learning and school-year learning. I found that during the summer holidays, SES achievement gaps increased in the United States, whereas they remained more stable in Finland. Because learning is mainly shaped by families during the summer holidays, the finding supports the notion that greater socioeconomic inequalities between families in the United States contribute to greater educational inequality. During the school year, SES achievement gaps in reading declined in Finland, but continued to grow in the United States. Thus, Finnish schools have a stronger equalizing effect than US schools. This finding goes against Berliner's claim that low levels of income inequality and poverty alone explain why Finnish students perform well in international comparative assessments independently of their socioeconomic background (Berliner, 2013).

Thus, educational inequality can be combatted by tackling inequalities that exist between families and between schools. One way to combat inequalities between families are taxes and transfers. An examination of families' incomes before taxes and transfers reveals that child poverty would not be higher in the United States than in other countries when only market incomes are considered. However, child poverty is lower in most other developed countries because their taxes and transfers are more effective in combatting child poverty than they are in the United States (Adamson, 2012). Consequently, American schools face a more difficult task than do schools in countries with lower child poverty rates as well as provisions such as universal health care systems. Schools in the United States reduce the growth of inequalities in achievement. However, they seem to be less effective in doing so than, for example, schools in Finland. Thus, not only is the performance of the United States inadequate in terms of combating child poverty, but more efforts are also required to improve the way that American schools function.

7.2.4 No trade-off between school integration and excellence in education

In chapter 6, I investigated whether schools have a stronger equalizing effect in more integrated education systems. Formally, both the United States and Finland have comprehensive education systems in which students learn together in one school type. However, in the United States, children from different socioeconomic backgrounds generally attend separate schools, whereas in Finland they attend school together. Most studies that have compared education systems have considered only formal differentiation (Van de Werfhorst & Mijs, 2010). However, even education systems that are comprehensive at a formal level can be very unequal in practice. I therefore proposed a broader conceptualization of differentiation that captures its more hidden forms (Blossfeld et al., 2016). My key conceptual contribution, discussed in this chapter, was my use of the extent to which children from different socioeconomic backgrounds attend the same or different schools as an indicator of inequalities between schools within a country. The advantage of using this indicator is that it not only captures inequalities between schools that are caused by formal differentiation, but it also captures more hidden forms of differentiation such as private schools or residential segregation.

My within-country analysis constitutes a methodological contribution to the literature. To investigate the effect of socioeconomic segregation within an education system, I did not simply compare socioeconomically integrated education systems with socioeconomically segregated education systems. This is because the fundamental problem regarding educational opportunities could stem from inequalities between families, or other unobserved features of a country, and not from inequalities between schools. To tackle this issue, I performed a within-country analysis, investigating how changes in the socioeconomic segregation of an education system affected the achievements of high- and low-SES students

My analysis of changes in the socioeconomic inclusiveness of education systems using five waves of PISA data from 2000 to 2012 revealed that socioeconomically disadvantaged students perform better when an education system becomes more socioeconomically integrated and that their performance deteriorates when it becomes more segregated. The

critical question, then, is how do socioeconomically integrated education systems affect students from socioeconomically advantaged families? Are they held back in their learning when they attend the same schools as their more disadvantaged peers, whose performance, on average, is below theirs? Is there a conflict between efforts to promote socioeconomically disadvantaged students and those that promote socioeconomically advantaged students within education systems? Even though my findings will surprise many parents, I show that advantaged students perform well in all school systems, regardless of whether or not the system becomes more socioeconomically mixed. In sum, advantaged parents are able to ensure that their children perform well in any kind of education system. By contrast, the performance of disadvantaged children depends more on school conditions. These findings are in line with those of other studies conducted on formal differentiation (Hanushek & Woessmann, 2006; Horn, 2009; Jakubowski et al., 2010; Kerr et al., 2013; Le Donné, 2014; Van de Werfhorst, 2013; Van de Werfhorst & Mijs, 2010).

7.3 Conclusion: Do schools reduce inequality?

In light of the above summary of the main findings of my study, I now return to my main research questions: What is the role of schools in the creation of educational inequalities? Are schools able to compensate for a disadvantaged family environment? My overall finding is that schools are better able to compensate for a disadvantaged family environment when they are socioeconomically integrated. This is supported by three of my findings. First, socioeconomically disadvantaged students learn more in schools with a greater intake of high-SES students, but less when they attend schools with other disadvantaged students. This holds when controlling for selection into schools using students' learning rates during the summer when schools are closed. Second, the equalizing power of schooling is higher in Finland than it is in the United States. Finland has a socioeconomically integrated education system, whereas the US education system is strongly segregated. Third, socioeconomically disadvantaged students perform better when an education system becomes more socioeconomically integrated over time. All of these findings support the conclusion that socioeconomically integrated schools provide better learning opportunities for students from disadvantaged families.

Contrary to the fears of many middle and upper class parents, their children do not learn less when an education system becomes more socioeconomically integrated. Rather, children from more privileged families perform well in all education systems. One reason for this finding could be that more privileged families are more successful at avoiding disadvantaged schools. However, I found that children from middle and upper class family backgrounds do not learn less when they attend more diverse schools in terms of the socioeconomic composition of their students. There are several possible reasons for this. First, their parents may hold schools and teachers responsible for instructional quality even if the student intake becomes more diversified. Second, parental resources provide a buffer against deteriorating school quality. Parents may be able to compensate for low instructional quality by supporting children with their homework or by paying for private tutoring.

Consequently, learning opportunities in schools are more important for socioeconomically disadvantaged children. This conclusion is also supported by a variety of findings within the literature. Coleman et al. (1966) found that low-SES students seemed to be more affected by school characteristics than high-SES students were. Second, studies have found that when schools reopen after the summer holidays, learning rates accelerate the most for low-SES children (Alexander et al., 2007; Downey et al., 2004; Heyns, 1978). Third, experiments on class size show that disadvantaged students benefit the most from smaller classrooms (Krueger & Whitmore, 2001; Pate-Bain, 1999). Fourth, studies on differentiation within secondary education, using a variety of methods, have also concluded that disadvantaged children learn more in less differentiated education systems, while advantaged children do not learn less than they would in more differentiated systems (Blossfeld et al., 2016; Hanushek & Woessmann, 2006; Horn, 2009; Jakubowski et al., 2010; Kerr et al., 2013; Le Donné, 2014; Van de Werfhorst, 2013). Therefore, both equality of opportunity and excellence in education can be simultaneously achieved.

However, too much hope is frequently placed on schools and the effects of families are underestimated for several reasons. First, the belief that schools are the "great equalizers," providing a route to social mobility is one aspect of a wider idea of meritocracy. In contemporary societies, education is considered a legitimate means of social reproduction and status attainment (Bowles & Gintis, 1976; Solga, 2016). Especially in the United States, education policy is regarded as a substitute for social policy (Heidenheimer, 1973, 1981).

Second, achievement gaps are already large before children even enter school. Nonetheless, even children whose early performance is similar develop differently depending on their socioeconomic backgrounds. Thus, low-SES students do not simply lack skills.

Third, family and school conditions are interlinked. Students from disadvantaged families face a cumulative disadvantage, because they generally attend disadvantaged schools. Because family and school conditions overlap, it is methodologically difficult to distinguish family and school effects. A similar methodological problem exists at the country level, as more unequal countries tend to have more unequal education systems. This makes it methodologically difficult to distinguish the effects of education systems from the effects of family conditions in a particular country. Scholars who do not consider this accumulation of disadvantage tend to overstate the effects of schools and education systems.

Processes of cumulative disadvantage are less pronounced in integrated school systems. In these systems, children from disadvantaged families are less likely to be concentrated within disadvantaged schools, which are schools avoided by good teachers and middle class parents. Instead, they are more likely to attend the same schools as their advantaged peers. This gives them access to high quality schools with higher quality teaching, peers with higher aspirations, and a school climate that is more conducive to better performance. Nonetheless, students continue to be exposed to different family learning environments. Walberg (1984) estimated that an 18-year-old student would have spent, on average, 13% of his or her waking hours in school. Thus, even when students from different socioeconomic backgrounds attend the same schools, this does not mean that they have completely equal learning opportunities.

Therefore, schools cannot fully compensate for inequalities in non-school resources and learning environments. Privileged families find ways to support their children and help them to succeed. Nonetheless, socioeconomically integrated schools can provide opportunities for children from disadvantaged families. Even though students only spend a small proportion of their waking hours in school, this time is especially important for children from disadvantaged families. For these children, in particular, schools can open up new worlds.

7.4 Shortcomings and further directions

7.4.1 Variations across elementary and high schools

I have tried to reconcile the findings on the equalizing effects of schooling with the findings on diverging trajectories resulting from tracking or segregation. Specifically, I have argued that the equalizing effect of schooling is stronger in countries where there is less socioeconomic segregation between schools and delayed tracking. However, I was unable to investigate whether the equalizing effect of schooling ceases when students make the transition to secondary education (Gamoran, 2016). This question is difficult to address with the available data. The literature on the effects of summer learning and school-year learning has focused on the elementary school years. However, the literature on tracking and differentiation has focused on secondary education (Blossfeld et al., 2016). Schools may be most egalitarian during the elementary school years, but more unequal at the level of secondary education. Therefore, the tendency for low-SES children to gain more from schooling than high-SES children may be strongest in elementary school.

A study on Baltimore suggests that the equalizing effect of schooling persists from grades 1 to 5 (Alexander et al., 2007), whereas a study on Atlanta suggests that an equalizing effect persists from grades 6 to 7 (Heyns, 1978). However, both studies, which were conducted in urban school districts, found larger compensatory effects of schooling compared with the findings of studies that used nationally representative data for the United States (Downey et al., 2004). Covering students in Indiana from grades 6 to 8, Carbonaro (unpublished) finds that achievement gaps between poor and non-poor students widen during the school year more than they do during the summer. Moreover, this effect increases with the progress of students through middle school. Contrasting with the findings of previous studies on seasonal learning, this finding supports the view that schools are stratifiers, not equalizers. Consequently it may be the case that the equalizing effect of schooling vanishes with advancing grades.

However, I was unable to investigate whether equalizing effects declined in higher grades, because I know of no dataset that assesses summer learning and school-year learning in primary and secondary school. In most countries, there are no datasets at all including biannual assessments of competencies. Thus, scholars attempting to separate family and school effects would have to gather data on summer learning and school-year learning in countries other than the United States as well as data for later grades. Alternatively, events or circumstances that affect the time spent by children in school could be exploited as natural

experiments. For example, the effects of school closures due to bad weather conditions for students' learning could be examined and compared across primary and secondary school.

Ideally, I would have liked to compare summer learning and school-year learning at the elementary and secondary school levels in the United States, Finland, and Germany. I would have expected schooling to have a more equalizing effect in Germany and Finland in elementary school, because elementary schools are less segregated in these countries than they are in the United States. However, secondary school students are only tracked in Germany and not in the other two countries. Thus, it is plausible that the compensatory effect of schooling would cease at this level in Germany. These analyses would have helped to deepen understanding of how schooling effects vary across grades and countries. However, they could not be performed with the available data.

7.4.2 Parents' educational behavior

Achievement gaps have been found to widen between children attending advantaged and disadvantaged schools, or between children in higher and lower tracks (Baumert et al., 2006; Kerckhoff, 1986; Maaz et al., 2008). However, as revealed by the summer learning literature, some portion of the growth in these gaps may occur because children continue to be exposed to unequal family environments during their schooling. Thus, achievement gaps could increase even without schooling because of unequal family learning environments. This is why researchers estimate the impact of schooling by subtracting summer learning rates from the school year learning rates during the school year.

However, this comparison becomes invalid if advantaged parents ensure that their children learn something during the summer, but are more relaxed about their children's learning during the school year, because they know that their children attend good schools. I investigated whether parents' educational behavior changed during the summer and the school year. An examination of parents' behavior revealed that the family learning environment did not remain the same during the summer holidays and the school year. During the school year, parents' educational behavior was found to be more compensatory, with parents of low-performing children reading more often to their children than parents of high-performing children. This could mean that the equalizing effect during the school year is not only due to schooling, but is also due to parents' behavior. However, this requires further investigation.

7.4.3 Changes over time

Another direction for future research would be to investigate how family and schooling effects change over time. Rising income inequality in the United States has led to growing achievement gaps between children from rich and poor families (Reardon, 2011). Yet, it is less apparent why this is so. According to Reardon (2013, p. 4), "high-income families are increasingly focusing their resources—their money, time and knowledge of what it takes to be successful in school—on their children's cognitive development and educational success."

What has not yet been investigated is how the effect of schooling changes across cohorts. Does rising income inequality in the United States reduce schools' equalizing power? If rising income inequality leads to rising residential segregation, this will consequently lead to a higher level of inequality between schools, thereby decreasing the equalizing effect of schooling. It is now possible to investigate this question, because the ECLS-K study has been expanded to include a new cohort of children. The first cohort started kindergarten in 1998/1999 and the second started kindergarten in 2010/11. For both cohorts, learning in preschool, summer, and in grade 1 can be estimated. Learning during the summer for the younger and older cohorts can therefore be compared. I would expect that during the summer, achievement gaps would grow more in the younger cohort than in the older cohort because of rising income inequality between families. Additionally, the change in learning from the summer to the school year could be compared to assess whether rising inequality has weakened the equalizing effect of schooling in the younger cohort.

7.4.4 What happens within schools?

The size and direction of schooling effects can be determined by comparing summer learning and school-year learning. However, the processes and conditions under which schools make a difference cannot be identified through this method (Gamoran & Long, 2007). I attempted to incorporate variations between schools and education systems. To do so, I used the socioeconomic student body composition of schools as an indicator of their quality and socioeconomic segregation between schools as an indicator of inequalities between schools within an education system. These indicators were chosen, because it was difficult to measure instructional quality more directly.

Because I focused on segregation and tracking between schools, I disregarded differentiation within schools. One example of within-school differentiation is within-school tracking (Fend, 2009; Gamoran & Berends, 1987; Heyns, 1974; Kerckhoff, 1986). Thus, even if children from different socioeconomic backgrounds attend the same schools, students from disadvantaged families may be concentrated within the lower tracks. Whereas within-school tracking may be more flexible than between-school tracking, it nonetheless creates unequal learning opportunities caused by unequal instructional quality. This issue is rarely addressed within comparative studies and may require further consideration.

7.4.5 Socioeconomic status, immigrant background, and race

Further research is also required to obtain a better understanding of why schooling stops the growth of SES achievement gaps and even helps children from immigrant backgrounds to catch up, while appearing to widen racial achievement gaps (Carbonaro, unpublished; Condron, 2009; Downey et al., 2004). Schooling may be most beneficial for children from immigrant families, because schools are the places where they learn and improve their English (or the native language of the country) (Carbonaro, unpublished; Lindahl, 2001; Verachtert et al., 2009). However, it remains unclear as to why schooling seems to increase racial achievement gaps. Do black students attend more disadvantaged schools in the United

States than do immigrant students? Understanding these mechanisms may also facilitate an understanding of why the Scandinavian countries are so successful at supporting low-SES students, but have largely failed to integrate children from immigrant backgrounds into their school systems.

7.4.6 Competencies, certificates, and labor market outcomes

In this study, I focused on children's reading and mathematics competence development. I did not consider other competencies such as civic and political engagement (Van de Werfhorst, 2014) or social competencies (Heckman & Kautz, 2012). In addition, I did not investigate the influence of educational differentiation on educational certificates or labor market outcomes.

The influence of schools on educational certificates and labor market outcomes differs from their influence on students' competencies. In my study, I considered the roles of formal and informal differentiation in creating inequalities between schools to be similar. However, formal differentiation is often linked to the acquisition of different educational certificates. Thus, for educational certificates, the effects of formal and informal differentiation may not be the same.

Labor market outcomes may also be affected differently by tracking, which tends to go hand in hand with vocational education and training systems. Vocational education and training systems ease labor market entry and provide a means to obtain skilled positions below the level of university, which is often the path chosen by students from disadvantaged families (Allmendinger, 1989; Bol & Van de Werfhorst, 2013; Brunello & Checchi, 2007; Shavit & Müller, 2000). Nonetheless, it is possible to delay differentiation within secondary education without abandoning the vocational orientation.

When examining labor market outcomes, it may also be useful to conceptualize education as a positional good (Van de Werfhorst, 2011). Instead, I focused on the absolute level of competencies, and found that disadvantaged students attained higher levels of competencies within integrated schools and education systems. However, it remains unclear whether this translates into higher certificates and labor market positions or whether privileged families can always secure an advantage for their children.

7.4.7 Can school accountability and additional resources substitute for desegregation?

I focused on the socioeconomic segregation of schools, leaving aside other characteristics of schools and education systems and how they interact with each other. For example, Bol, Witschge, Van de Werfhorst, and Dronkers (2014) argue that central examinations counterbalance the stronger impact of parents' socioeconomic backgrounds on students' performance within tracked education systems. This raises the question of whether it is possible to reduce inequality between schools without tackling socioeconomic segregation between schools, simply by introducing common standards and holding schools accountable for meeting these standards. This policy option is appealing as this would not be costly and

would be unlikely to face resistance from parents. As Rumberger and Palardy (2005, p. 2000) argue, "many education and government officials, as well as some civil rights leaders, have come to believe that integrating schools is less important than providing adequate resources and setting high standards for all students and schools."

However, Schwartz (2010) finds that providing disadvantaged schools with more money is less effective than public housing policies that enable students from poor families to attend schools with low numbers of poor students. An important route for further research is thus to evaluate and compare different social and educational policies and how they interact.

7.5 Policy implications

To increase the equality of educational opportunities, it is important to ascertain whether and under what conditions schools are able to compensate for a disadvantaged family environment, giving children from low socioeconomic backgrounds the opportunity to succeed in education. If schools are able to reduce educational inequality, reforms addressing instructional quality and inequalities between schools should be the focal point of efforts to promote educational opportunities. However, if it is true that inequalities between families are the underlying problem, then social policies for reducing inequalities between families may be more appropriate "educational" policies than those that are directly aimed at changing schools. School policies may also be of minor importance if SES achievement gaps develop even before children enter school. I will now discuss the policy implications of my findings.

7.5.1 Making gains in preschools sustainable

I found that disadvantaged children already lag behind their peers from advantaged families in (pre) reading competencies when they enter school. One way to reduce these gaps is to invest in high-quality preschools (Blossfeld, Kulic, Skopek, & Triventi, 2017; Esping-Andersen, 2002; Heckman, 2006). According to Heckman, the most efficient way of improving student performance is to invest in their performance from an early age. This is because early skills are the foundation for subsequent learning. This does not mean that schools have no effect on educational inequality; rather, their effect is limited because it builds on what happened before children entered school.

However, my findings suggest that even children whose initial skills at school entry were similar but who come from different socioeconomic backgrounds develop differently. Consequently, it is not enough to invest in preschool education. This is because even high-performing preschool children from disadvantaged families tend to fall behind their peers who perform at similar levels but come from better-off families. Thus, learning does not automatically beget learning. This suggests that the US strategy of investing in preschool education for the poor, but then leaving these children to attend disadvantaged schools, makes it likely that the gains made in preschool will be lost over the course of their schooling. Thus, the long-term effects of preschools depend on classroom experiences after preschool (Magnuson, Ruhm, & Waldfogel, 2007).

7.5.2 Extending the time that students spend in schools and in childcare

The comparison of learning during the summer and the school year reveals that schools are able to partly compensate for a lack of cognitive stimulation at home. Thus, disadvantaged children benefit most from the time they spend in school compared with the time they stay at home. This suggests that one way to increase equality of educational opportunity is to increase the time that children spend in school. There are several ways to achieve this. First, the three-month summer break could be shortened. Alternatively, free childcare or summer camps could be provided during the summer holidays. Some remedial summer schools exist for children at risk. However, for all other children, what they do during the summer largely depends on their parents' resources.

Another method of increasing the time spent in school is to extend the number of years of schooling. Extending the number of years of schooling by preponing school entry to a younger age entails increasing preschool education, while making it affordable for low-income families, and improving its quality. Extending schooling during adolescence entails making schooling compulsory until a later age. Alternatively, all-day schooling could be introduced to extend the time spent in school.

However, the comparison of summer learning and school-year learning has shown that the equalizing effect of schools is rather limited. If schools only exert a weak equalizing effect, then the question is whether the education system could be changed in a way that increases the compensatory effect of schooling. Whereas the literature on summer learning and school-year learning has been mostly based on evidence from the United States, I attempted to expand this literature by including an examination of different countries.

7.5.3 Integrating schools across socioeconomic lines

I found that schools are better able to compensate for disadvantaged family environments when they are socioeconomically mixed. This was also one of the main findings of the Coleman Report: The research results indicate that "a child's performance, especially a working-class child's performance, is greatly benefited by going to a school with children who come from educationally stronger backgrounds" (Coleman in an interview cited in Kahlenberg (2016, p. 3)). This finding has been confirmed using longitudinal data (Aikens & Barbarin, 2008; Rumberger & Palardy, 2005) and random allocation to public housing (Schwartz, 2010, 2012). Even within comprehensive education systems, integrating schools across socioeconomic lines remains challenging. The best example is the United States, which has a formally comprehensive education system but a high level of socioeconomic segregation between schools.

However, mixing students is often opposed by middle and upper class parents. This opposition continues despite my finding that advantaged children do not learn less in education systems that become more diversified. For example, I found that in the Finnish

education system, in which schools are maximally integrated with regard to their socioeconomic backgrounds, high-performing children do not perform worse than they do in segregated or tracked education systems.

There are two alternative reform paths for increasing the quality of disadvantaged schools. The first entails investing additional resources in disadvantaged schools. The second entails the introduction of educational standardization and accountability to reduce inequalities between schools (Wössmann & Peterson, 2007). These reforms could face less resistance than desegregating schools and are therefore appealing. However, there are indications that desegregating schools by socioeconomic background closes achievement gaps to a greater extent than investing additional resources in disadvantaged schools (Schwartz, 2012). Schools for the poor often become poor schools, even if they acquire more resources.

7.5.4 Addressing socioeconomic inequalities between families

Critics, however, state that directing attention toward education reforms takes the focus away from the more fundamental problem of socioeconomic inequality between families (Berliner, 2013; Downey et al., 2004; Merry, 2013; Solga, 2012, 2014). Therefore, they argue against social investment strategies that focus on increasing education opportunities, which they view as "education only policies" (Brown & Tannock, 2009, p. 389). In place of these policies, they suggest that compared with education policies, redistributive policies that are devoted to combatting inequalities between families would lead to more equal opportunities in education.

A number of my findings support the position that families are crucial determinants of educational inequality. First, large SES achievement gaps are already in existence even before children enter school. Second, high-SES families seem to be better able to support their children, enabling them to catch up over time even if they enter school with a low level of competencies. Third, during the summer months, SES achievement gaps grow more in the United States than in Finland where the level of socioeconomic inequality is lower. All of these findings support the conclusion that educational inequality is deeply rooted in inequalities between families in terms of resources and behavior.

Therefore, schools alone cannot close achievement gaps. Potential policies to address socioeconomic inequality include redistribution, minimum wages, and increased employment opportunities. These policies can ensure that families experience less stress caused by financial problems and are better able to support their children. For example, Black, Devereux, Løken, and Salvanes (2014) find that higher disposable incomes among low income families lead to improvements in children's academic performance in middle school in Norway. Similar findings have emerged from studies that examined changes in the earned income tax credit in the United States, which is aimed at improving the incomes of working poor families (Chetty, Friedman, & Rockhoff, 2011; Dahl & Lochner, 2012; Duncan, Morris, & Rodrigues, 2011; Maxfield, 2015). Whereas these policies have resulted in more money in the pockets of poor families, policies that promote public housing programs, public infrastructure for children, and free health care reduce the dependence of children's well-being on available money. To sum up, policies and programs that address socioeconomic

inequalities between families by increasing resources, support, and public infrastructure help to reduce educational inequality.

Yet, programs to improve family learning environments have not been especially successful. One notable exception is a program involving home visits by nurses to new mothers. Children from poor families visited by nurses for two years performed better in reading and mathematics achievement tests at the age of 12 years compared with children whose mothers did not participate in the program (Olds et al., 2010).

These findings emphasize the effectiveness of policies that support families. They, therefore present a contrast with an "education only" welfare state. Schools alone cannot close SES achievement gaps. If we are serious about reducing inequality, we have to reduce inequalities between families.

In addition, the dichotomy between educational policies and those aimed at reducing income inequalities between families may be overly simplistic. To desegregate schools, for instance, it is necessary to desegregate neighborhoods (Schwartz, 2010). Desegregation requires augmenting the incomes of the poorest households or expanding public housing programs. Thus, social and educational polices go hand in hand.

The Scandinavian countries have typically combined social and educational policies, whereas many English-speaking countries use investment in human capital as a substitute for social spending (Heidenheimer, 1981; Morel et al., 2012). My findings indicate that both families and schools play a role in shaping educational inequalities. Consequently, a combination of social and educational policies may be needed to increase educational opportunities (Allmendinger & Leibfried, 2003, 2005; Solga, 2014). Substituting social spending with education policies does not account for the fact that educational inequality is largely shaped by families. Thus, education reformers often place too much hope in schools without addressing the underlying problem of socioeconomic inequality. Instead of sending only teachers to Finland to learn from their education system, we should also send social and health care workers, and social policymakers to learn from Finnish welfare state policies. However, advocates of "redistribution only" policies also forget that schools provide important learning opportunities, especially for students from disadvantaged families. Therefore, promoting the integration of schools, based on the socioeconomic composition of their student bodies, facilitates schools in opening up new horizons for students from disadvantaged families.

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I, Anne Christine Holtmann, certify that I am the author of the work "Why are children from disadvantaged families left behind? The impact of families, schools and education systems on students' achievement" that I have presented for examination for the Ph.D. at the European University Institute. I also certify that this is solely my own original work, other than where I have clearly indicated, in this declaration and in the thesis, that it is the work of others.

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This thesis has been corrected for linguistic and stylistic errors. I certify that I have checked and approved all language corrections, and that these have not affected the content of this work.

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