Does More Schooling Lead to Less or More Inequality of Educational Opportunity?

Michael Grätz

University of Lausanne; Stockholm University

michael.gratz@unil.ch

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Abstract

Critical theories of education but also the dynamics of skill formation model predict that the education system reproduces educational inequalities. Contrary to this hypothesis, empirical studies comparing the change in inequalities in academic performance over the summer to the change in these inequalities during the school year, have argued that schooling reduces educational inequalities. The present study sheds new light on the question whether schooling affects educational inequalities by analyzing another natural experiment, which induces exogenous variation in the length of schooling. Some German states moved the school start from spring to summer in 1966/1967. These states introduced two short school years, which were each three months shorter than regular school years. We use variation in the short school years across cohorts and states to estimate the effects of the length of schooling on educational inequalities using two German panel surveys. Less schooling due to the short school years did not affect educational inequalities. This finding runs counter to both the results from the summer learning literature and to the predictions of the dynamics of skill formation model and critical theories of education. We conclude by discussing the implications of this finding for our understanding of educational inequalities.

Keywords: education, inequality of educational opportunity, natural experiment, schooling

INTRODUCTION

In modern societies, education in formal institutions has become a fundamental part of the human life course. Liberal thinkers such as John Dewey (1966) and Ralf Dahrendorf (1965) emphasize the equalizing role of the educational system in modern societies, arguing that only through schooling equality of educational opportunity can be achieved. The role of schooling has, however, not been uncontroversial. Several sociological theories argue that the education system reproduces inequalities. These theories include cultural capital theory, which is developed around the claim that the education system rewards children for their cultural capital, which is transmitted to them from their parents and which does not increase their educational performance (Bourdieu 1979; Bourdieu and Passeron 1966, 1970). Further support for this perspective comes from Willis' (1978) ethnographic study of English working class children who develop a "counter-school culture" which does not allow them to profit from schooling. In the United States, Bowles and Gintis (1976, 2002) argue that the American school system reproduces social hierarchies because it prepares working class children for working class jobs by making them to accept the hierarchy in the education system, which resembles the hierarchy in the capitalist economy.

Following these theoretical and, on an empirical level, descriptive investigations from the 1970s a number of more recent sociological studies have employed natural experiments to identify the causal effects of schooling on the reproduction of inequalities. The evidence of these studies, as reviewed by Raudenbush and Eschmann (2015), provides no support to the theories developed by Bourdieu, Passeron, Willis, Bowles, and Gintis. To the contrary, some of these natural experiments suggest that schooling reduces inequality of educational opportunity. In particular, a number of empirical studies have shown that socioeconomic differences in skills grow more during the summer, when no schooling takes place, than during the school year (Alexander, Entwisle, and Olson 2001, 2007; Burkam et al. 2004; Downey, von

Hippel, and Broh 2004; Entwisle and Alexander 1992; Heyns 1978, 1987; Holtmann and Bernardi 2019; Verachtert et al. 2009).

More recently, however, methodological critiques of these studies have emerged arguing that after taking into account measurement error the increases in socioeconomic inequalities in skills during the summer are smaller than previously assumed and of little substantive importance (von Hippel and Hamrock 2019; von Hippel, Workman, and Downey 2018). In addition, evidence from other research designs does not find the benefits of more schooling for skill development to vary by family socioeconomic background (Carlsson et al. 2015; Passaretta and Skopek 2020). In economics, the dynamics of skill formation model also predicts that "skills beget skills and abilities beget abilities" (Cunha and Heckman 2007:10). Therefore children from socioeconomically advantaged families should profit more from schooling than children from socioeconomically disadvantaged families (Raudenbush and Eschmann 2015). Finally, recent ethnographic evidence suggests that, in line with Willis' (1978) study of English school children, for instance, universities can increase the intergenerational transmission of advantage (Armstrong and Hamilton 2015). As a result, evidence on the effects of schooling on the intergenerational transmission of education is mixed and new studies that can identify the causal effect of schooling on educational inequalities are called for. In addition, most empirical studies focused on the effects of schooling on socioeconomic differences in the short-term measured via test scores but not on the long-term effects of schooling on the intergenerational transmission of educational attainment in terms of the highest educational degree completed.

We estimate in the present study the effects of the length of schooling on the intergenerational transmission of education by exploiting the natural experiment of the short school years, which occurred in Germany in 1966/1967. Several German states decided in 1964 to move the start of the school year from after Eastern (April) to the summer (August/ September). In order to achieve this change these states introduced in 1966 and 1967 two short

school years (Helbig and Nikolai 2015). These short school years did not run for 12 but only for 9 months. For this reason, students in school during both short school years were exposed to up to six months less of schooling than their counterparts, who were in school after or before the short school years took place. The identification of the effect of the short school years on the intergenerational transmission of education is facilitated by the fact that some German states did not implement the short school years and can therefore be used as a control group. Meister (1972) and Thiel (1973) estimated the short-term effects of the short school years on pupils' test scores whilst they were still in school. In addition, Pischke (2007) showed that employment and earnings were not affected by the short school years. He did, however, not analyze variation in the effects of the short school years by social origin. The present study is unique in investigating the long-term consequences of the short school years in 1966/1967 in Germany for the intergenerational transmission of education.

DOES SCHOOLING INCREASE OR DECREASE INEQUALITY OF EDUCATIONAL OPPORTUNITY?

The function of schooling in a society is a debated issue. Economists often see the primary purpose of the education system in improving children's skill development (Bradbury et al. 2015; Cunha and Heckman 2007; Hanushek 1979; Heckman 2000). Functional theories developed in sociology attribute to education the main function of matching women and men to labor market positions (Davis and Moore 1945; Parsons 1959; Sorokin 1959).

Whilst in functional theories the role of schooling is perceived as positive, it is criticized from a Marxist perspective. Bowles and Gintis (1976) argued that the school system prepares children to accept the hierarchies in the capitalist economy. Bowles and Gintis (1976:11) wrote that schools "create and reinforce patterns of social class, racial and sexual identification among

students which they allow them to relate to "properly" to their eventual standing in the hierarchy of authority and status in the production process".

Cultural capital theory, as developed by Bourdieu and Passeron (1966, 1970) and Bourdieu (1979), also argued that the school system reproduces social inequalities. This theory is based on the claim that the education system values cultural capital, which is transmitted from parents to their offspring. Importantly this is not due to cultural capital increasing children's educational performance but due to a positive view teachers have of the cultural capital of the socioeconomically advantaged social classes.[1]

Further empirical support for the notion that schooling increases inequality of educational opportunity comes from an ethnography of pupils from working class families in the United Kingdom (Willis 1978). The working-class pupils observed in this ethnography develop a counter-school culture. More schooling does not change the counter-school culture and does therefore not benefit the offspring from working-class families.[2] Therefore, only children from socioeconomically advantaged families will profit from more schooling. As a result, this perspective leads us to expect an increase in the intergenerational transmission of education as a consequence of an increase in the length of schooling.

A further reason why schooling may reproduce educational inequalities is ability-grouping and tracking within schools (Oakes 2005). In addition, the quality of schools which children from socioeconomically advantaged families attend may be better than the quality of schools which children from socioeconomically disadvantaged families attend. Within the same schools, children from socioeconomically advantaged families may ask for more and receive

[1] For a formal model of cultural capital theory see Jæger and Breen (2016).
[2] The cohort studied by Willis (1978) was affected by the raise in the school leaving age (RSLA) in England, an educational reform which increased the minimum school leaving age from 15 to 16 in 1972. Sturgis and Buscha (2015) showed that this reform had largely no effects on the intergenerational transmission of advantage, confirming Willis (1978) ethnographic observations.

more support from teachers than children from socioeconomically disadvantaged families (Calarco 2018).

Finally, the dynamics of skill formation model in economics predicts that students from socioeconomically advantaged families profit more from schooling than children from socioeconomically disadvantaged families (Cunha and Heckman 2007; Heckman 2000; Raudenbush and Eschmann 2015).

Contrary to these sociological and economic theories, liberal philosophers argue that schooling has an equalizing function (Dahrendorf 1965; Dewey 1966). Differences in the learning environment at home between socioeconomic groups may be larger than differences in the school environment (Raudenbush and Eschmann 2015). If that is the case, schooling does reduce social inequalities. Lareau's (2011) ethnographic work described how children from socioeconomically advantaged families participated in educationally oriented activities whilst out of school. Contrary to that, children from socioeconomically disadvantaged families had more free time and liberty to do what they liked. As a result the "schools as equalizer" (Downey et al. 2004) hypothesis argues that reducing the length of schooling increases the intergenerational transmission of education.

We can conclude that there are sociological theories arguing that increasing the length of schooling strengthens the intergenerational transmission of education as well as an opposing theoretical perspective according to which more schooling leads to more equality of educational opportunity. Solving the question whether schooling increases or decreases the intergenerational transmission of education is therefore an empirical task. Most empirical tests of the effects of the length of schooling on educational inequalities so far focused on the question whether inequalities in skills are reduced or increased by schooling. Contrary to this, our study focuses on inequalities in educational attainment, measured by the highest educational degree completed.

Raudenbush and Eschmann (2015) provided an overview over the literature using different natural experiments to estimate the effects of schooling on socioeconomic differences in children's skills. They reviewed studies estimating the effects of free and universal education in early childhood, summer vacation, the extension of the school day, and changes in the length of compulsory schooling on socioeconomic inequalities in education.

The arguably best known of these studies compare differences in learning rates by family socioeconomic background during the school year to differences in learning rates by family socioeconomic background during summer, when no schooling takes place. Alexander et al. (2001, 2007) demonstrated that in a sample of students from Baltimore socioeconomic differences in learning grew more over the summer than over the school year. Downey et al. (2004) replicated these results for a sample representative for the United States. Most research on the effects of summer vacation on learning inequalities used data from the United States but Holtmann and Bernardi (2019) and Verachtert et al. (2009) found also evidence for this dynamic in Europe.

Von Hippel and Hamrock (2019) provided a critique of the research comparing learning in the summer to learning during the school year. They argued that most previous results in this literature were affected by two sources of measurement error. First, results were influenced by the scaling method used to evaluate children's performance. Second, changes in the type of test administered before and after the summer break influenced the results. Correcting in their own empirical analysis for these types of measurement error led von Hippel and Hamrock (2019) to conclude that socioeconomic differences in children's educational performance were already in place before formal schooling started and did neither systematically grow nor systematically shrink more in summer than during the school year.

There is also another problem of the research design employed in the summer learning literature, which is pointed out by Passaretta and Skopek (2020). The research design has to

assume that any differences in learning rates between the summer and the school year are due to the absence of schooling. However, it may also be that there are other factors related to summer than the absence of schooling which affect educational inequalities. For instance, the weather in Europe and in Northern America (the geographic areas on which the summer learning literature has focused) is warmer during the summer and there is more daylight. Therefore, there are more opportunities to spend time outside. This may affect learning negatively and more so in socioeconomically disadvantaged than in socioeconomically advantaged families.

Comparing socioeconomic differences in the skill development over the summer to socioeconomic differences in the skill development during the school year is not the only research design which has been used to estimate the effects of schooling on educational inequalities. Passaretta and Skopek (2020) used differences in the age at testing to estimate the effects of days in the first grade in primary school on educational inequalities in Germany. They found that schooling increased skills but that these skill returns to schooling did not vary by family socioeconomic background. In a similar analysis, using measures of intelligence from military conscription tests among male adolescents in Sweden, Carlsson et al. (2015) found no socioeconomic differences in the effects of the number of school days spent prior to the test on test performance by parental education and father's earnings.

A limitation of these two studies (Carlsson et al. 2015; Passaretta and Skopek 2020) is, that there is rather little variation in the amount of schooling in this research design. The students who are tested later experienced some days but not several months more of schooling. The differences in the amount of schooling in these studies could be too small to have lasting consequences for educational inequalities.

ANALYZING THE GERMAN SHORT SCHOOL YEARS TO ESTIMATE THE EFFECTS OF SCHOOLING ON INEQUALITY OF EDUCATIONAL OPPORTUNITY

Our study sheds new light on the question whether schooling increases or decreases educational inequalities by exploiting as a natural experiment the German short school years, which reduced the length of schooling for some students by about six months. Pischke (2007) analyzed the effects of the German short school years on student performance and, which was his main focus, on earnings. Earlier studies also estimated the effects of the short school years on student performance (Meister 1972; Thiel 1973). However, none of these studies investigated the effects of the short school years on inequality of educational opportunity measured in terms of educational attainment, which is the focus of our study.

The short school years are the result of a change in the month in which the school year starts. Before the reform, the school year started in all (West) German states, with the exception of Bavaria, after the Easter holiday, i.e. in April. Bavaria, along with other European countries, started the school year in August. In 1964, the German state governments decided collectively to move the school start in all states to the summer (August or September) (Helbig and Nikolai 2015; Pischke 2007). Initially the agreement was to accomplish this change by introducing one long school year running from April until August of the next year. However, only the state of Hamburg ended up implementing this solution. Bavaria, as mentioned above, did not have to change the start of the school year, as they already started in August before the reform. For these reasons, Hamburg and Bavaria are used as the control group in the empirical analysis.

Seven West German states (Schleswig-Holstein, Bremen, Nordrhein-Westfalen, Hessen, Rheinland-Pfalz, Baden-Württemberg, and Saarland) accomplished the change of the start of the school year by introducing two short school years, which did run from April 1966 until November 1966 and from December 1966 until July 1967. In other words, pupils who attended school during these years completed two grades with a reduced length of instruction from 12 to

9 months (not counting the holidays, the length of which were not affected by the reform). As a result, students exposed to the full two short school years in primary school spent about six months less in primary school than the cohorts not affected by the short school years.[3]

Importantly, the policy change in shortening the school year by ¼ was not accompanied by a change in the curriculum (Pischke 2007). In addition, teachers did not compensate for the loss in instruction time over the year by increasing the number of class hours per week. Based on a survey of teachers, Thiel (1973) concluded that that most teachers did not offer additional classes and those who did provided at best one hour more of teaching per week. Pischke (2007:1226) also showed evidence that teachers were not more often ill during the short school years than before and after. In sum, there is no evidence that strong compensatory measures were taken, which could have counteracted the reduction in instruction time resulting from shortening the school year. The natural experiment of the short school years in West Germany in 1966/1967 has therefore general implications for reductions in instruction time.

In the empirical analysis we focus on the effects of the short school years respondents experienced whilst they were in primary school. This is done because of the central role of early tracking, which occurs in Germany after four years of primary school (Henninges, Traini, and Kleinert 2019; Hillmert and Jacob 2010). In particular, attending a university requires the completion of the highest level of upper secondary education (*Gymnasium*). The transition to the *Gymnasium* is made after the four years of primary school around age 10. Therefore, exposure to the short school years in primary school is most relevant for final educational attainment.

[3] Pupils from Niedersachsen and Berlin are dropped from the analysis sample. Niedersachsen did partially comply with the change but not completely. Therefore, it is unclear whether Niedersachsen would belong to the treatment or to the control group. Berlin was dropped because in one of the two data sets it was impossible to determine among respondents from Berlin whether they grew up in West or in East Germany (i.e., in the German Democratic Republic [GDR]) and because primary school was six years long in West Berlin and therefore two years longer than in the other West German states.

It is important to understand how the natural experiment analyzed in the present study differs from the natural experiments employed by previous research to study the effects of schooling on educational inequalities. Contrary to the literature on summer learning, the focus of the present study is on the consequences of shortening instruction time. This shortening of instruction time by about six months is particular crucial in the German education system, as students make the transition to secondary school in Germany after only four years of primary school. We estimate how the transition to different types of secondary school is affected by a considerable reduction (6 months/ 48 months = 12.5%) in the time students are in school before this transition is made.

Of the three previous studies analyzing the effects of the short school years on child education (Meister 1972; Pischke 2007; Thiel 1973), only Meister (1972:115) reported results stratified by family socioeconomic background. He distinguished between two socioeconomic classes based on father's occupation, referred to as working and middle class, and showed that the increase in performance in reading and math among pupils who experienced the short school years was more pronounced in working than in middle class families. In other words, the results by Meister (1972), which were based on the before-and-after comparison of pupils going to schools in one city in one of the seven states that implemented the short school years[4], suggested that both student's average academic performance and educational equality increased through the two short school years (in line with the critical theories of education and the dynamics of skill formation model). The present study provides the first analysis of the long-term consequences of the German short school years on educational inequalities. It also uses a more robust research design exploiting variation across both states and cohorts to estimate the causal effects of the length of schooling on the intergenerational transmission of education and it employs data which is nationally representative for Germany.

[4] The city was Saarbrücken, which lies in the state Saarland.

DATA, VARIABLES, AND ANALYTIC STRATEGY

Data

The empirical analysis employs two nationally representative survey data sets from Germany. These data sources are the German Socio-Economic Panel Study (SOEP; Goebel et al. 2019) and the Starting Cohort 6 of the National Educational Panel Study (NEPS; Blossfeld, Roßbach, and von Maurice 2011). We harmonize the variables across the two data sets and pool both data sets to increase the precision of point estimates.[5]

The sample is restricted to women and men born between 1951 and 1965. This sample selection ensures that the birth years affected by the short school years in primary school (1956 to 1960) as well as some birth years before (1951 to 1955) and after (1961 to 1965) the reform are used. The sample is restricted to respondents who lived in the Federal Republic of Germany before 1989, as the reforms were conducted in this country. In other words, respondents who lived abroad or in the German Democratic Republic ("East Germany") are excluded from the analysis. We also drop respondents from Berlin from the analysis sample, as this was the only state in Germany in which primary school was six years long and therefore two years longer than in all other states. Finally, we drop respondents from Niedersachsen from the analysis, as the implementation of the reform was different in Niedersachsen than in the other states. As a result, respondents in the analysis sample come from nine states (Baden-Württemberg, Bavaria, Bremen, Hamburg, Hessen, Nordrhein-Westfalen, Rheinland-Pfalz, Saarland, and Schleswig-Holstein). Seven of these states belong to the treatment group as they implemented the short school years; two did not and are therefore part of the control group (Bavaria and Hamburg).

[5] By doing so, we follow the approach of Skopek and Leopold (2020).

Measures

Educational Attainment. The main outcome of the analysis is the completion of upper secondary education (level 3 of the International Standard Classification of Education [ISCED]). In both data sets, the highest level of education of a respondent is observed. This information is recoded in a binary variable which is set to 1 for women and men who completed upper secondary education. This level of education used to be at the time of the reform the major dividing line of the German education system (Dahrendorf 1965) and still is today, as Germany has, compared to other countries, a rather low level of tertiary education (Helbig and Nikolai 2015). As a robustness check, we also report results using years of education as a continuous indicator of educational attainment. This variable measures the years of schooling corresponding to the highest educational degree obtained by the respondent.

Household Income. In addition to educational attainment, we also investigate the consequences of the German short school years for respondent's current household income. Because this variable is measured in two different ways in both data sets, we standardize the variable within each data set. The results should therefore be interpreted in terms of standard deviations. Using household income allows us not only to investigate the effects of the short school years on socioeconomic differences in educational attainment but also on socioeconomic differences in labor market outcomes.

Social Origin. Social origin is measured in three ways. First, we use information on mother's and father's education. A binary variable is constructed which is set to 1 if one of the parents completed the upper track in the German education system (*Gymnasium*).[6] This corresponds to a high level of parental education. Second, as a robustness check, we employ a measure of parental years of education. Third, as a further robustness check, we report results

[6] Table S1 in the *Online Supplement* demonstrates that the findings do not differ if, instead of looking at the highest level of parental education, we look at maternal or at paternal education.

using measures of father's and mother's occupational status based on ISEI (Ganzeboom and Treiman 1996). The results are virtually identical across all three measures of social origin.

Short School Years. The main independent variable is the number of short school years a respondent experienced whilst being in primary school. This variable is continuous and includes values of 0, 1, and 2. Given that primary school in Germany is four years long, it means that those respondents, who were fully exposed to the short school years, spent half of their time in primary school in short and the other half in regular (i.e., long) school years. In Germany, students enter primary school at the start of the first school year after their sixth birthday. The short school years occurred in April to November 1966 and in December to July 1967 (Pischke 2007; Helbig and Nikolai 2015). Pupils born in 1959 entered school in April 1966, whilst students born in 1958 entered school in April 1965. Students born in 1957 entered school in April 1964. They all experienced two short school years whilst being in primary school. Students born in 1956 entered school in 1963 and had already completed three full years in primary school when the short school years were introduced. They were therefore exposed to the first short school year, running from April to November 1966 in their last year in primary school and transitioned to secondary school in December 1967.[7] Pupils who were born in 1960 entered school in December 1966 and therefore experienced one short school year. Students born in 1961 entered school in August 1967 and therefore did not experience any short school years. Similarly, students born in 1955 and earlier were already in secondary school or had already completed their schooling when the short school years occurred. They are therefore assigned a zero on the short school years variable. In addition, students from Hamburg and

[7] Students in secondary school were also affected by the short school years. We focus, however, on primary school as we are interested in how the short school years affected the transition to secondary school. After this transition is made, there is only little movement between secondary school tracks in Germany, in particular among the cohorts we look at (Henninges, Traini, and Kleinert 2019; Hillmert and Jacob 2010).

Bayern are assigned a zero on this variable independent of their year of birth, as these states did not have short school years.[8]

A potential source of bias could be that the data does only provide information on the current state of residence at the time of the interview and not of the state someone was born in or, what would make the analysis most reliable, where someone went to school. It is, however, quite uncommon to move between states in Germany, especially among the cohorts we study (Pischke 2007). For instance, all states in Germany have universities and usually students go to universities in the same state they went to school in. Therefore, the bias introduced by this data limitation is likely to be small.

Control Variables. All models control for state and cohort fixed effects as well as for sex via a dummy variable which is set to 1 for male respondents. In addition, all models control for a dummy for the survey in which a respondent participated (SOEP or NEPS).

Descriptive statistics on all variables used in the analysis are provided in Table 1.

[INSERT TABLE 1 ABOUT HERE]

Hypotheses and Analytic Strategy

Critical theories of schooling as well as the dynamics of skill formation model predict that shortening the length of schooling decreases the intergenerational transmission of education. Contrary to this, the "schools as equalizer" (Downey et al. 2004) hypothesis argues that if children spend less time in school the intergenerational transmission of education should be increased. To test these opposing hypotheses against each other, we exploit variation in the

[8] The results are robust to operationalizing the short school years through two dummy variables: one which is set to one for students who experienced one short school year in primary school and one which is set to one for students who experienced two short school years in primary school. This specification, which is reported in Table S2 in the *Online Supplement*, leads to virtually identical results as the specification using a continuous variable reported in the main text.

implementation of the short school years in Germany across cohorts and states. This variation allows us to isolate the effects of the short school years on educational attainment. Estimating variation in these effects by social origin allows us to test whether the length of schooling affects the intergenerational transmission of education.

The identification strategy of our study is motivated by the main analysis reported by Pischke (2007). However, it is different in crucial aspects, as Pischke (2007) did, in his main analysis, not focus on the exposure to the short school years during primary school.[9]

To be precise we estimate the following types of models:

$$y_{ist} = \alpha_0 + \alpha_1 O_{ist} + \alpha_2 S_{ist} + \alpha_3 O_{ist} X S_{ist} + \alpha_4 M_{ist} + \alpha_5 N_{ist} + \zeta_s + \eta_t + \varepsilon_{ist} \quad (1)$$

With y being the outcome of interest (Gymnasium attendance, years of education, and household income) of individual *i* in state *s* from birth cohort *t*, O being the measure of social origin, and S being the continuous variable indicating the number of short school years a respondent was exposed to (as indicated by Table 1). The interaction effect S_{ist} and O_{ist} estimates whether the effects of the short school years vary by social origin. This interaction is what the analysis focuses upon, as it measures whether the intergenerational transmission of education is affected by the number of short school years.

The analysis includes a control for male (M), survey (N) as well as both state (*s*) and cohort (*t*) fixed effects (through dummy variables for each state and each year of birth). These controls ensure that the analysis isolates the causal effects of the short school years on the intergenerational transmission of advantage.

[9] In one part of his analysis Pischke (2007) isolated the effects of the short school years in primary school. This part of his analysis is more closely related to ours. However, Pischke (2007) did not investigate socioeconomic differences in the effects of the short school years, which are the central focus of our study.

RESULTS

Main Analysis

The results of our preferred specification are reported in Table 2. The table reports Linear Probability Models of the effects of the short school years on the completion of upper secondary education.[10] The interaction between social origin and high parental education is the focus of the analysis, as this interaction indicates whether the change in the length of schooling affected the intergenerational transmission of education.

[INSERT TABLE 2 ABOUT HERE]

The results are unequivocal. The intergenerational transmission of advantage was not affected by the short school years. The interaction between social origin and the short school years is statistically insignificant as well as substantively small. The estimate suggests that each short school year increased the intergenerational transmission of education by two percentages points. Given that the main effect of high parental education is 32.5 percentage points, this is a substantively negligible change. What is more, the estimate is statistically insignificant and therefore not generalizable to the population level.[11]

[10] We report Linear Probability instead of logistic regression models because of the more straightforward interpretation of the coefficients of the former and because of their stronger robustness to the inclusion of interaction and fixed effects, which are both necessary for the present analysis (Ai and Norton 2003; Angrist and Pischke 2009; Gomila 2021; Mood 2010).

[11] The finding of no main effect of the short school years on educational attainment is in line with previous research estimating the effects of the short school years on educational performance (Meister 1972; Pischke 2007; Thiel 1973).

Robustness Checks

We conducted a number of robustness checks to ensure that the finding of no effect of the short school years on the intergenerational transmission of education is not due to some coding decision. This section reports these robustness checks.

[INSERT TABLE 3 ABOUT HERE]

First, Table 3 reports OLS regression models estimating the effects of the short school years on years of education. Again, the interaction between parental education and the short school years is both statistically insignificant and substantively small. Hence, using years of education as an outcome supports the conclusion that the short school years did not affect the intergenerational transmission of education.

[INSERT TABLE 4 ABOUT HERE]

Second, we not only investigated the effects of the short school years on educational attainment but also on income. We used household income, standardized within each survey to account for the variation across surveys, and estimated OLS regression models. These models, reported in Table 4, show that the association between parental education and offspring's income was not affected by the short school years.

[INSERT TABLE 5 ABOUT HERE]

Third, instead of a dummy variable indicating a high level of parental education, we also estimated models using parental years of education as a measure of social origin. These models

are reported in Table 5. The estimates of these models fully support the main conclusion of the analysis of no effect of the short school years on the intergenerational transmission of educational advantage. The interaction between parental years of education and the short school years is zero and statistically insignificant.

[INSERT TABLE 6 ABOUT HERE]

Fourth, we used parental occupational status (ISEI) instead of parental education as a measure of social origin. These models, which are reported in Table 6, demonstrate that the association between parental occupation and child education was also not affected by the short school years.

CONCLUSION AND DISCUSSION

How does more schooling affect the intergenerational transmission of advantage? This study reports results from a natural experiment to answer this important question. The findings are robust across different specifications and demonstrate that the short school years in Germany in 1966/1967 have neither increased nor reduced inequality in educational opportunity.

These findings are at odds with two opposing theoretical perspectives motivating this type of research. On the one hand, the findings do not confirm the predictions of the dynamics of skill formation model (Cunha and Heckman 2007) and of critical theories of education (Bourdieu and Passeron 1966, 1970; Bourdieu 1979; Bowles and Gintis 1976, 2002; Willis 1979), which argue that more schooling increases the transmission of advantage across generations. On the other hand these findings also do not confirm the more recent notion that more schooling equalizes the educational outcomes among children (Downey et al. 2004; Raudenbush and Eschmann 2015).

Whilst the results of the present study are at odds with these theories, they are actually in line with a large body of evidence research on the sociology of education has produced in the last decades, which suggests that schools have little effect on the intergenerational transmission of advantage. The Coleman report concluded already in the 1960s that non-school factors are more important in shaping equality of opportunity than school factors (Coleman et al. 1966). Several more recent empirical studies also suggest that schooling neither reduces nor increases socioeconomic inequalities. For instance, with respect to a much more recent cohort of German school children than the one analyzed in the present study, Skopek and Passaretta (2020) found socioeconomic inequalities in educational performance to emerge before formal schooling takes place and to be largely constant during the school career. These findings are mirrored by results for the United States according to which socioeconomic inequalities in educational performance in the United States emerge before school starts and vary little over the school career (von Hippel and Hamrock 2019).

In terms of more causally oriented designs, other natural experiments also found schooling not to affect socioeconomic inequality in educational performance. Passaretta and Skopek (2020) exploited variation in the age at school entry and the age at test in the first year in primary school to estimate the effects of the length of schooling on socioeconomic inequalities in educational performance in Germany. They found no such effects, in line with our results in the present study. Similar results were obtained by Carlsson et al. (2019), who analyzed intelligence scores from male military conscription tests in Sweden. The findings of both these studies also match with results reported by von Hippel and Hamrock (2019), according to which the evidence is inconclusive whether socioeconomic differences in test scores grow more during the school year or during the summer holidays in the United States.

Finally, suggestive support for the idea that schooling plays rather a limited role in the intergenerational transmission of education comes from research comparing educational

inequalities across countries. This research has not managed to provide a consistent and robust ranking of countries in terms of educational inequality (Breen and Jonsson 2005; Grätz et al. 2021; Triventi et al. 2020). Therefore, it is unlikely that school characteristics, which vary across countries, have strong effects on inequality of educational opportunity. With respect to one such school characteristic, the age of the allocation to school tracks, causal research found that reforms in the age at tracking affected the association between parental occupational class and child education but that the same reforms did not affect the association between parental education and child education (van de Werfhorst 2019). Triventi et al. (2020) argued, summarizing the results of a project comparing inequality in educational opportunity across 17 countries with different educational systems, that socioeconomically advantaged families always find ways to transmit advantage to their offspring.

For all these reasons, the findings of the present study, whilst being certainly arising in a specific context, are part of a more general pattern. As a consequence, we argue that social scientists interested in explaining the intergenerational transmission of advantage should change their focus of attention from school to non-school factors. Further progress in this area requires a better understanding of which processes operating within families affect educational inequalities.

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TABLES

Table 1. Descriptive Statistics

	Mean	**SD**	***N***
Upper secondary education	0.42	0.49	13,898
Years of education	13.00	2.71	13,806
Household income (standardized)	0.00	1.00	13,855
High parental education	0.19	0.39	12,979
High maternal education	0.06	0.23	12,998
High paternal education	0.17	0.38	12,979
Parental years of education (highest)	10.93	2.72	13,698
Parental occupational status (ISEI)	42.46	15.98	11,384
Short school years	0.40	0.74	13,929
Male	0.49	0.50	13,929

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

Table 2. OLS Regression Models Estimating the Effects of the Short School Years on the Completion of Upper Secondary Education

	(1)	(2)
High parental education	0.317*	0.325*
	(0.011)	(0.012)
Short school years	0.001	0.005
	(0.012)	(0.012)
Male	0.121*	0.121*
	(0.008)	(0.008)
High parental education X		–0.019
Short school years		(0.014)
N	12,950	12,950

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

Table 3. OLS Regression Models Estimating the Effects of the Short School Years on Years of Education

	(1)	(2)
High parental education	2.229*	2.262*
	(0.057)	(0.065)
Short school years	0.036	0.052
	(0.063)	(0.064)
Male	0.507*	0.506*
	(0.044)	(0.044)
High parental education X		–0.077
Short school years		(0.073)
N	12,869	12,869

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

Table 4. OLS Regression Models Estimating the Effects of the Short School Years on Household Income (standardized)

	(1)	(2)
High parental education	0.303*	0.319*
	(0.024)	(0.027)
Short school years	0.011	0.019
	(0.026)	(0.026)
Male	0.105*	0.105*
	(0.018)	(0.018)
High parental education X		–0.038
Short school years		(0.030)
N	12,917	12,917

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

Table 5. OLS Regression Models Estimating the Effects of the Short School Years on the Completion of Upper Secondary Education, Using Parental Years of Education to Measure Social Origin

	(1)	(2)
Parental years of education	0.055*	0.055*
	(0.002)	(0.002)
Short school years	–0.002	0.000
	(0.011)	(0.025)
Male	0.117*	0.117*
	(0.008)	(0.008)
Parental years of education X		–0.000
Short school years		(0.002)
N	13,668	13,668

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

Table 6. OLS Regression Models Estimating the Effects of the Short School Years on the Completion of Upper Secondary Education, Using Parental Occupational Status (ISEI) to Measure Social Origin

	(1)	(2)
Parental occupational status	0.009*	0.009*
	(0.000)	(0.000)
Short school years	–0.003	–0.006
	(0.013)	(0.020)
Male	0.115*	0.115*
	(0.009)	(0.009)
Parental occupational status X		0.000
Short school years		(0.000)
N	11,379	11,379

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

ONLINE SUPPLEMENT TO

Does More Schooling Lead to Less or More Inequality of Educational Opportunity?

This version: October 25, 2021

Table S1. OLS Regression Models Estimating the Effects of the Short School Years on the Completion of Upper Secondary Education (*Gymnasium*), Comparing Maternal and Paternal Education

	(1)	(2)
High maternal education	0.360*	
	(0.021)	
High paternal education		0.324*
		(0.013)
Short school years	0.003	0.003
	(0.012)	(0.012)
Male	0.119*	0.120*
	(0.008)	(0.008)
High maternal education X	–0.018	
Short school years	(0.025)	
High paternal education X		–0.019
Short school years		(0.015)
N	12,969	12,950

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)

Table S2. OLS Regression Models Estimating the Effects of the Short School Years on the Completion of Upper Secondary Education (*Gymnasium*), Using Dummy Variables for the Short School Years

	(1)	(2)
High parental education	0.317*	0.324*
	(0.011)	(0.013)
One short school year	0.008	0.011
	(0.029)	(0.030)
Two short school years	0.001	0.009
	(0.024)	(0.025)
Male	0.121*	0.121*
	(0.008)	(0.008)
High parental education X One		–0.010
short school year		(0.035)
High parental education X Two		–0.041
short school years		(0.029)
N	12,950	12,950

Notes: Standard errors. All models control for the survey (NEPS or SOEP) as well as fixed effects for state and year of birth.

Sources: NEPS SC6, v11 and SOEP, v36 (pooled).

* $p < 0.05$ (two-tailed tests)