

Culture and school performance: Evidence from second-generation immigrants in Norway*

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Abstract

We study the effects of parenting style on students' school performance, assuming that immigrant parents' child-rearing strategies derive from the culture in the country of origin. We combine data from the World Value and European Value Surveys to measure parenting values, and Norwegian population-wide register data on family background and students' schooling outcomes. We categorize parents as authoritative when they value child independence rather than obedience. A permissive parenting is less demanding, and let children develop their own talents. We find that an authoritative style yields better schooling outcomes than parenting emphasizing children's obedience. A permissive practice yields weaker results.

JEL Codes: I21, I24, J24, Z1

Keywords: Culture; School performance; Epidemiological approach

- *Hey, teachers, leave them kids alone*
All in all it's just another brick in the wall
Pink Floyd, from "Another Brick in the Wall" (1979)
- *Success is no accident. It is hard work, perseverance, learning, studying, sacrifice and most of all, love of what you are doing or learning to do.*
Pelé (Edson Arantes do Nascimento), possibly the greatest footballer of all times

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1. Introduction

International student assessment tests like PISA and TIMSS¹ display large cross-country disparities in students' school performance. Many Western countries, including Norway, attain modest positions in these country rankings. This is worrying; cognitive skills are essential for labor market participation, earnings and life prospects in general. For example, Hanushek et al. (2015) exploit individual-level data from 22 countries, and show that numerical skills relate positively to the workers' wage levels. Analysis of country-level data suggests that years of schooling can be misleading indicator of human capital, and that test scores display larger, positive correlations with rates of economic growth (Hanushek and Woessmann 2016). For example, the strong growth performance in East Asia is associated with high math and science test scores, not with years of schooling. Despite numerous policy initiatives to improve results, many Western countries have seen stagnant schooling results since the assessment programs were introduced more than two decades ago.² The current paper suggests that the educational outcomes are at least partly embedded in parents' cultural backgrounds³, thereby accounting for the persistence of schooling results.

Parents can influence their children's choices in two ways: either by shaping children's preferences, or by imposing constraints on their choices. Following the classification of "parenting styles" in developmental psychology (Baumrind 1971; Doepke and Zilibotti 2017), an authoritative parenting style implies that parents attempt to shape their children's preferences, with the aim of inducing choices that parents view as conducive to success in life. We argue that an authoritarian upbringing insisting on children's obedience is incompatible with authoritative parenting. Following findings in developmental psychology (for review, see Masmud et al. 2014), our key hypothesis is that the independence-oriented authoritative style has a positive effect on school performance. The permissive parenting style allows children greater autonomy to allow for self-discovery of individual talents.

¹ The Programme for International Student Assessment (PISA) is an international study conducted by the Organization for Economic Co-operation and Development (OECD). It covers students' scholastic performance in mathematics, science, and reading. The Trends in International Mathematics and Science Study (TIMSS) is a similar test focusing on assessments of mathematics and science.

² For an overview of learning results in PISA and TIMSS in the Nordic countries, see Nordic Council of Ministers (2018). For the US case, see the outline in the *New York Times*, December 3, 2019: "'It Just Isn't Working': PISA Test Scores Cast Doubt on U.S. Education Efforts", see link: <https://www.nytimes.com/2019/12/03/us/us-students-international-test-scores.html>

³ Culture is a broad concept and no "standard" definition is available. For example, Guiso et al. (2006:23) suggest the following definition: "Those customary beliefs and values that ethnic, religious and social groups transmit fairly unchanged from generation to generation". Fernandez (2011) uses the following formulation: "... the integrated pattern of human knowledge, belief, and behavior that depends upon the capacity for learning and transmitting knowledge to succeeding generations."

Permissive parents are more lenient than authoritative parents are. We contend that permissiveness allows children to shy away from effort, and that the laxer parenting style therefore leads to weaker schooling performance.⁴

The fact that parenting strategies, parental levels of human capital, school standards and student performance evolve together makes empirical testing challenging. Studies that combine survey data on parental attitudes with test-score data on children present interesting associations, but do not offer credible estimates of causal effects (see for example, Dornbusch et al. 1987; Golsteyn et al. 2014; Cadena and Keys 2015; Doepke and Zilibotti 2017:1346-47). In line with Fernandez and Fogli (2009), we apply the epidemiological approach to estimate causal effects (for review, see Fernandez 2011). The key idea is to estimate the effects on school performance of students who receive the same education and live in similar neighborhoods but have immigrant parents with different cultural origins. The Norwegian case is particularly suitable for this approach since parents and their offspring meet a unitary schooling system, with a standardized curriculum and marginal private school enrollments.

The egalitarian setting in Norway offers a striking contrast to the U.S., particularly with respect to parental and student incentives. On one hand, a publicly financed schooling system offers all an opportunity to excel at school. For example, parental education levels are not decisive for the child's level of education (Black et al. 2005; 2007), and parental income levels in Norway are weaker correlated with children's incomes than in the U.S. (Raaum et al., 2007; Bratsberg et al. 2017). On the other hand, the modest dispersion in wage levels means that the stakes are lower. Norwegian parents know that children can expect a decent standard of living irrespective of educational results. Facing weaker labor market incentives than in the US, parents are more likely to opt for a permissive parenting style (Doepke and Zilibotti 2017).⁵

We have access to individual-level register data from Statistics Norway covering the entire student population for the 2007–2015 period. The data yields a precise identification of native and immigrant parents and their country of origin. Immigrants to Norway are a self-selected group from the country of origin. We adjust for self-selection using individual-level data in the World Value Survey (WVS)

⁴ In the review of Masmud et al. (2014), the authors conclude: “After analyzing the results of the highlighted studies, it can be concluded that authoritarian and permissive parents are less effective in child development than authoritative parents.”

⁵ Doepke and Zilibotti (2017) suggest these cultural differences are due to income disparities: “Permissiveness flourishes in the egalitarian context with modest gains from education, while the authoritative style thrives in the incentivized context.”

and the European Value Survey. We identify the country-specific cultural values of sub-populations defined by cohort and education levels and we merge these cultural indicators with corresponding individual-level data on immigrant parents. The data allows us to analyze student tests scores, exam results and learning progression in primary and lower-secondary school as well as choice of specializations at the upper-secondary level. We present regression models separately for students with one and two immigrant parents, and include control for immigration reasons, parental education levels, labor-market participation, household income levels, school fixed-effects and several country-of-origin characteristics.

The baseline model assumes that people coming from different countries differ in cultural orientation only, conditional on the controls included in the regression models. This approach might produce biased estimates of causal effects as consequence of unmeasured country-of-origin features affecting both parental values and school performance. One way of accounting for this is the value-added model, where we estimate cultural effects, controlling for students' initial test scores. Another strategy exploits that children with identical ancestry have been exposed to different doses of country-of-origin culture. Cultural effects are diluted when students receive a larger infusion of Norwegian culture. We estimate models for students with two immigrant parents coming from the same country vs. students with one immigrant and one native parent. This strategy allows us to estimate models with country-of-origin fixed effects.

Our central result is that the authoritative child-rearing style (in contrast to the authoritarian style) yields better student outcomes, while a permissive parenting style has a negative effect on schooling results. Parenting values affect student performance in mathematics, reading tests in Norwegian and English as well as exam results in these languages. We see this pattern in analysis of (low-stakes) test scores as well as (high-stakes) exam results. The main estimates derive from analysis of data on students raised by two immigrant parents from the same country of origin. Similar, but consistently smaller estimates derive from analysis of data on students with one native and one immigrant parent.

The current paper relates to several literatures. One is studies of the impact of culture on economic outcomes. Important papers have addressed effects on interpersonal trust (see, for example Knack and Keefer 1996; Algan and Cahuc 2010; Falk et al. 2018), thriftiness and the probability of becoming an entrepreneur (Guiso et al. 2006), occupational choices (Zhan 2015), fertility, and women's work participation (Fernandez and Fogli 2009; Alesina and Giuliano 2015). These studies are also related to papers on immigration and the intergenerational transmission of values (Franssen et al. 2019).

The results presented here shed light on studies analyzing the effects of culture on economic growth. For example⁶, Tabellini (2010) combines historical data on economic developments in 69 West European regions with a set of WVS indicators. Cultural traits – including the level of children’s submission to parental authority – appear to affect economic development negatively, possibly through the functioning of political institutions. The current paper indicates that cultural effect might be transmitted through educational outcomes. Similarly, Gorodnichenko and Roland (2017) argue that individualistic cultures generate affluence since they reward individual accomplishments. Individualism is a cultural trait that emphasizes personal freedom and achievement. In contrast, collectivism encourages conformity to a group and loyalty to, and respect for, one’s superiors. As in Tabellini (2010), cognitive skills might be a key mechanism that links the effects of cultural values to economic development.⁷

Parenting is commonly understood as an agency problem where parents cater for children’s longer-term interests. Existing studies have used micro-data to analyze the effects of early-life time-preferences on a host of later outcomes, including school performance and subsequent labor-market outcomes (Golsteyn et al. 2014; Cadena and Keys 2015). Figlio et al. (2019) contribute to this literature by applying an epidemiological approach, which offers more convincing causal estimates than research designs mostly relying on selection on observables. Analyzing data on Florida’s immigrant populations, the authors find that immigrant students with parents originating from

⁶ Several studies analyze the impact of cultural values on rates of economic growth (Granato et al. 1996; Barro and McCleary 2003; Becker and Woessmann 2009; Tabellini 2010; Algan and Cahuc 2010; Gorodnichenko and Roland 2017).

⁷ Three papers use more limited datasets from the PISA program. Levels et al. (2008) analyze data on the mathematics performance of 7,400 immigrant students based on the 2003 PISA study. The analysis includes data on immigrants to 13 host countries (mostly in Western Europe) from 35 different countries of origin. This design allows the authors to analyze both country-of-origin and destination effects. Immigrants doing well in the country of origin tend to have high test scores in the new country as well. The analysis is limited by the small sample of immigrant students, particularly from second-generation immigrant students. Jerrim (2015) focuses on second-generation children of East Asian immigrants to Australia, who appear to do extremely well as measured by international test scores. These “immigrants” are born and raised in Australia, and educated by the Australian school system. The data includes about 14,000 students, only 276 of which are second-generation immigrants of East Asian origin. Interestingly, these students obtain mathematics scores that are substantially higher than their native peers (about 100 PISA test points). The study covers a small sample of immigrants, and it addresses the influence of cultural background only indirectly. Nollenberger et al. (2016) exploit similar data from the four waves of the PISA program, yielding about 12,000 second-generation immigrant students. They address the impact of gender equality on the gender gap in mathematics test scores. They estimate a regression model where student gender is interacted with an indicator of the gender gap in the country of extraction. This specification allows the authors to include country-of-origin fixed effects. Attitudes to the role of women in society appear to have a major impact on gender differences in math test scores.

countries with a strong long-term orientation tend to display better educational performance. We deviate from Figlio et al. (2019) by analyzing the parenting strategies extensively discussed in developmental psychology (Baumrind 1971; Masmud et al. 2014); that is the effectiveness of authoritative (rather than authoritarian) and permissive parenting. We apply the epidemiological approach, and push this identification strategy further by exploiting heterogeneity as consequence of immigrants paring with native as well as immigrant spouses.

2. The institutional setting

This section provides a brief description of the Norwegian school system, the national testing regime and key aspects of immigration and immigration policies.

The Norwegian school system

The public sector is organized as a two-tier system comprising a central government, 19 county governments and 429 municipalities (2011). Education is a shared responsibility of central government, counties and municipalities. Primary and secondary education comprise a unified school system. Schools operate a standardized curriculum, defined by central government. Compulsory schooling starts at the age of six and lasts for ten years.

Nearly all schools are publicly funded, owned and managed by the municipal authorities. About 97% of students attend the publicly owned primary schools. Primary and lower secondary education are operated by the municipalities, and are subject to extensive national regulation. All schools offer a standardized core curriculum defining common learning content, and the same number of teaching hours in each subject. All students are entitled to attend the nearest primary school, and they generally attend the primary and upper secondary schools closest to home. Students from different cultural backgrounds attend the same schools and belong to the same classes. The final compulsory school exams are in the tenth grade, where a third of the students are randomly selected to take a final exam alternatively in mathematics, Norwegian or English.

After the end of compulsory education, students can choose to leave school or to enroll in upper-secondary education operated by the county government. About 95 percent of students enroll in upper-secondary education the year they finish compulsory education, and a little more than half of the students take academic tracks. Students rank three different study tracks when applying for enrollment.

All students have a legal right to be enrolled in one of these three tracks, but which track and school they enroll into depends on achievement in compulsory education measured by their teacher grades and the results on the exit examination. Three of the 15 study tracks qualify for higher education (academic tracks) and 12 tracks result in a certificate for work in a wide range of occupations (vocational tracks).

The school-testing scheme

The national test program was established as a permanent system in 2007⁸. All students are tested in mathematics, reading in English, and reading in Norwegian at the beginning of grades 5 and 8, and in mathematics and reading in Norwegian at the start of the ninth grade. The English and math (numeracy) tests are performed on a digital platform, while the reading in Norwegian language is performed on paper. The individual test results are confidential; only the students, their parents, teachers and school management have access to the students' test results. The national test scores are not used to grade students, and are applied to improve teaching quality and adjust education to individual needs. The Directorate for Education and Training publishes average test scores at the municipal and school level.

Immigrants and immigration policies

Statistics Norway has defined the immigrant population as "persons with two foreign-born parents, both of whom have immigrated to Norway and those born in Norway of two foreign-born parents." Norwegian-born with immigrant parents are born in Norway of two parents born abroad and in addition have four grandparents born abroad.

Immigration has transformed the Norwegian population structure over the last generation. The number of immigrants residing in Norway in 1970 was about 60,000, most of whom came from other Western European and Scandinavian countries. The current immigrant population is about 880,000 (2017), or nearly 17 percent of the total population. One group of immigrants is job seekers, mostly from the European Union /European Economic Area (EU/EEA). Another group is refugees, who has been granted permanent residence either as asylum seekers or as family members through the family reunion program.

The legal framework regulating the treatment of asylum seekers and family reunions is decided at the

⁸ National school testing was established in 2004 as one element of a national quality assessment system. Because of strong resistance from teacher unions and some political parties, no students were tested in 2005 and 2006, but tests were reintroduced in 2007.

national level. The UDI (Norwegian Directorate of Immigration) processes applications for protection, family reunion and residence. When an asylum seeker is granted permanent residence, the Directorate of Integration and Diversity (IMDi) is in charge of refugee resettlement. Refugees are resettled in municipalities across the country. A matching grant program offers an incentive for the local authorities to receive refugees. Refugees are entitled and obliged to complete a two-year introductory program, during which they receive economic support.

3. Measuring parenting strategies

We analyze effects of two dimensions of parenting cultures (Baumrind 1971; Doepke and Zilibotti 2017). The first is *authoritativeness*, and captures parenting cultures that emphasize children's independence, responsibility and determination. This strategy does not rely on parental instructions and child obedience, and is arguably incompatible with an authoritarian parenting style. The second is *permissiveness*, where parents attach importance to children's imagination and tolerance, while children's effort is not valued to the same extent.

Survey data sources

We use data from the World Value Survey and the European Value Survey to measure these dimensions. The World Value Survey data derive from the integrated, longitudinal file covering six waves. We use data from the three last waves in the World Value Survey (from 2000 onwards), comprising 91 countries and more than 250,000 respondents.⁹ The European Value Survey gives us data from 16 additional countries and about 22,000 respondents. We were able to merge individual-level register data for parents originating in 101 countries. We use survey data for respondents aged 50 or less.

Measurement model

We use data from a survey instrument that taps child-rearing values:

Here is a list of qualities that children can be encouraged to learn at home.

⁹ The World Values Survey (WVS) is a large set of national surveys that have been developed to understand how cultural change affects political and economic outcomes. A baseline questionnaire has been translated into the relevant languages, and administered to the national samples. Source: World Values Survey 1981–2016 Longitudinal Aggregate. World Values Survey Association (www.worldvaluessurvey.org). (For information on the European Value Survey: <https://europeanvaluesstudy.eu/>). We document the number of second-generation immigrants from the various countries in Appendix Table B1.

Which, if any, do you consider to be especially important? Please choose up to five!

The respondents could choose from eleven characteristics: independence, hard work, feeling of responsibility, imagination, tolerance and respect for other people, thrift (saving money and things), determination (perseverance), religious faith, unselfishness, obedience, and self-expression.

Authoritativeness has been defined as a style “... where parents attempt to mold their children’s preferences, with the aim of inducing choices that parents view as conducive to success in life.” (Doepke and Zilibotte 2017:1332). It is therefore evident that authoritativeness implies valuation of ‘independence’. Parents provide guidance, and want their children to make responsible decisions. Authoritative parents would also prefer children to develop their talents with a degree of resolve. Conversely, we suggest that an authoritative style is incompatible with an authoritarian style: a parent that values children’s independence cannot at the same time demand obedience. Our measurement model relies on a simple additive index to measure the authoritative – *not* authoritarian - style:

$$\text{Authoritativeness} = (\text{Independence} + \text{Responsibility} + \text{Determination}) * 0.33 - \text{Obedience}$$

A permissive parenting strategy means that children should be allowed “... to make free choices according to their natural inclinations, in the spirit of Rousseau.” (Doepke and Zilibotti 2017: 1332). First, imagination captures the essence of permissiveness; that children should be encouraged to explore their innate creativeness. A culture that appreciates individuals who develop their distinctive talents and interests must accept that others pursue their particular aptitudes – tolerance. The potential downside of the permissive parenting style is insufficient effort, particularly in the area of schooling. As compared to the authoritarian strategy, permissiveness implies that parents can be more lenient and likely to tolerate indiscipline.¹⁰ We measure permissiveness by an additive index:

$$\text{Permissiveness} = (\text{Imagination} + \text{Tolerance}) * 0.5 - \text{Hard Work}$$

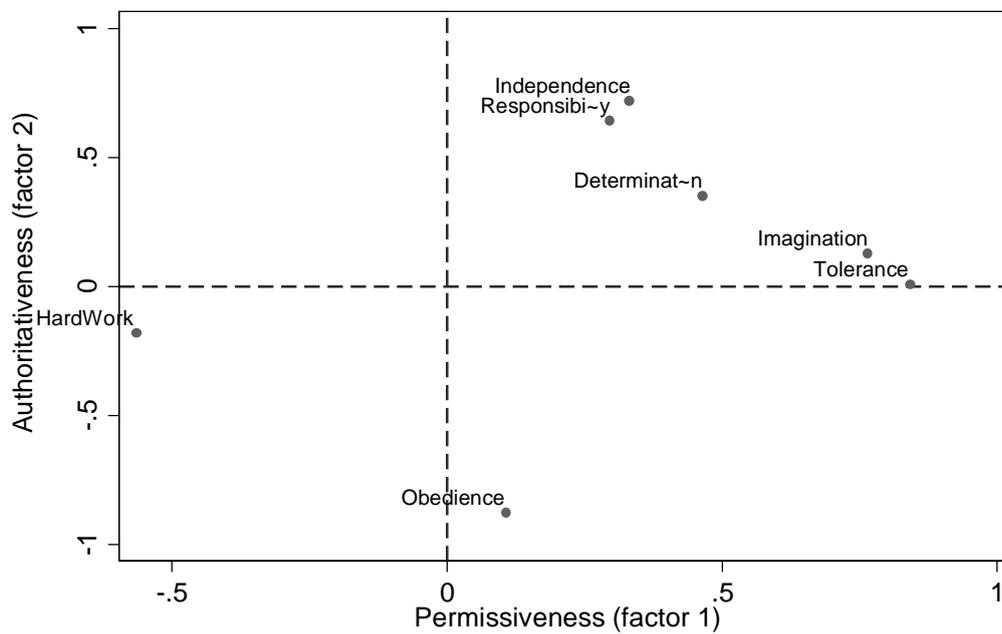
Our measurement model is comparable to Doepke and Zilibotti (2017: 1336), who measures an

¹⁰ For example, Masmud et al. (2014) states that “Lack of discipline, undemanding and highly responsive represents characteristics of permissive parenting. Children are free to make decisions in their social matters. There is no compulsion or direction from parents to their children.” However, it could be argued that high levels of permissiveness is compatible with different degrees of parental support, suggesting that this category might be somewhat heterogeneous (Maccoby and Martin 1983).

authoritative style by *not* subscribing to obedience. They suggest that ‘hard work’ is a desirable trait for authoritative parents, which we think has a vague justification. The measurement of permissiveness is similar. Doepke and Zilibotti define parents as permissive if they are not authoritarian or authoritative (as defined by the responses to the World Value Survey), but value children independence and/or imagination.

Principal component analysis

The validity of our measurement model be assessed using a principal component analysis of the country level indicators. We present further details on the analysis in Appendix Table B.1. In Figure 1, we display the rotated factor loadings when extracting two principal components. The horizontal dimension shows that hard work is not consistent with the parenting values of imagination and tolerance, which we therefore identify as the Permissiveness dimension (factor 1). The vertical dimension suggests that valuing obedience is incompatible with independence, determination and responsibility. We label this dimension Authoritativeness (factor 2). We think the pattern displayed in Figure 1 offers quite compelling evidence in support for the measurement model.



Rotation: orthogonal varimax
 Method: principal-component factors

Figure 1. Principal component analysis of cultural indicators

Notes. The diagram displays the rotated factor loadings of a principal component analysis. The data derive from the World Value Survey and the European Value Survey, which included a survey battery of parenting styles (see main text). We exploited surveys conducted from the year 2000 onwards, and calculated the share of respondents in each country identifying each of the values as ‘especially important’. The country-level data were used as input to the principal component analysis, and comprised the following parenting values: independence, hard work, feeling of responsibility, imagination, tolerance and respect for other people, determination (perseverance) and obedience. The diagram displays the rotated factor loadings.

In Figure 2, we display country-level values for the parenting values. The plot shows that the two indicators are positively related at the country level ($r=0.35$; $N=101$). A number of countries with a relatively low GDP per capita have low scores on both permissiveness and authoritarianism, while countries in Eastern Europe and East Asia display high scores on authoritarianism values and low scores on permissiveness. Like Doepke and Zilibotti (2017, Figure 1), we observe that the Scandinavian countries – Norway, Denmark, Sweden and Finland – have the higher scores on the permissiveness values.

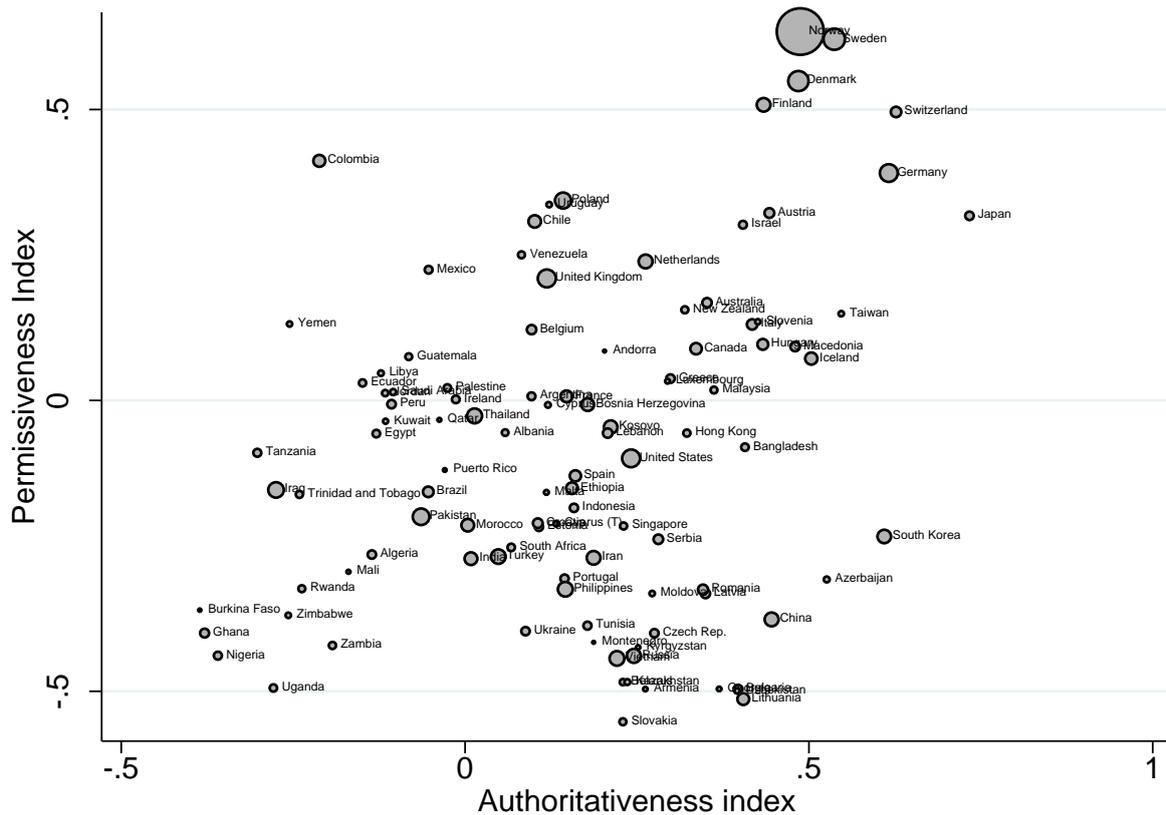


Figure 2. Cross-country variations in parental cultures

The diagram shows country-level averages for the Authoritativeness and the Permissiveness indexes. The data derive from the integrated, longitudinal file covering six waves. We use data from the last three waves in the World Value Survey (from 2000 onwards). The European Value Survey gives us data from 16 additional countries. The bubble sizes are proportional to number of Norwegian-born students with parents born in the relevant countries.

The Online Appendix (Figure A.1) displays the developments in the cultural indexes for subsets countries where sufficient time series are available. Most countries show developments away from

authoritative parenting focusing on obedience towards a style emphasizing independence, responsibility and determination. These trends can be seen in the context of global shifts towards support for liberal values (Inglehart 2008; Welzel 2013). The permissiveness dimension indicates highly contrasting developments. Some countries – including the USA, Spain, Australia and South Africa – experience a decline in support for permissive parenting. Two other countries – Norway and Sweden – display an opposite trend, where a larger share of the population support a permissive parenting style.

4. Register data on students and parents

The Statistics Norway dataset covers the entire student population, and includes school performance data over the period 2007-2015. These observations are linked to data on the students' mothers and fathers, where at least one of the parents is not born in Norway.

Data on students

The register data yields information on parent and student birthplace, whether they are born in Norway (second-generation immigrants) or in the country of ancestry (first-generation immigrants). We distinguish between students having one immigrant parent and one native parent, and two immigrant parents from the same country of origin. The upper panel in Table 1 contains descriptive statistics for the student-level variables. Data cover nearly 100,000 observations where students have one immigrant parent and about 59,000 observations where students have two immigrant parents. These students have parents arriving from 101 countries (students with one immigrant parent) and 97 countries (students with two immigrant parents). The dataset comprises school identification. Students with one immigrant parent attend 2,961 different schools, while students with two immigrant parents go to 2,086 schools. The dataset yield information of number of siblings and the student's birth order (parity). Appendix Tables B.2 provides additional summary statistics.

Data on school performance

We have access to data on the national tests conducted at the fifth and eighth grade level (in primary and lower secondary schools), and the exam results from the 10th grade. The data comprise information on students' specialization choices when they enter the higher secondary level, whether

they enrolled in an academic track and chose theoretical math specialization.¹¹ The test scores and exam results are standardized (mean:0, standard deviation:1) over the entire sample of students with one- and two immigrant parents, and the calculation is performed separately for each year.

The data allow us to track the progression of individual students over two- and three-year intervals (5.-8. level, 8.-10. level). For example, we observe each 5th grade student in 2007; the students reach the 8th grade in 2010 and the 10th grade in 2012. These students make their specialization choices when entering the higher secondary level in the autumn of 2012. The samples used to analyze student value-added are more limited since our data covers student performance 2007-2015 period.

Cultural backgrounds can affect students' (intrinsic) motivation to do well on tests. In a field experiment, Gneezy (2017) found that US students did much better when test performances were linked to economic rewards, while students in Shanghai had a much weaker response to incentives. It is therefore interesting to compare cultural effects on (low-stakes) test scores and (high-stakes) exam results.

Though we analyze students born in Norway, these students may face language barriers depending on the ancestral language. For example, Böhlmark (2008) analyzes whether students' age of arrival to Sweden influences their schooling performance. Age-at-immigration affects performance negatively, but has lesser bearing on the mathematics results. This indicates that mathematics is equally "strange" for all students, offering a (more) level playing field. In this context, Table 1 shows that students with two immigrant parents have lower test scores than those with one immigrant parent. This difference appear to be somewhat smaller in mathematics than reading. In Appendix Table B.3, we present descriptive statistics on within- and between-school variations.

Data on parents

The data comprises immigrant parents having children aged 11, 14 and 16, and includes information on the immigrants' country of origin, and the reason for migrating to Norway. In Table 1, we present summary statistics on the family situation (married, divorced, cohabitants), mothers' and fathers' birth year, work experience, wage income, and education level. The table shows that families with one immigrant parent are better educated, which is particularly evident when we compare shares having a

¹¹ The dataset has few missing observations. Income from work of parents about whom we lack education level information is particularly low, indicating low levels of education from their country of origin.

university degree or more. Parents in these one-immigrant families collect higher wages, and have a higher probability of being employed than families with two immigrant parents.

Merging survey data and individual-level data

Immigrants from similar countries have heterogeneous value orientations, and display dissimilar attitudes to child rearing. Cultural values have changed considerably over recent decades (Appendix Figure A.1). We therefore classify the survey responses from each country by birth year 1970, which facilitates cohort-specific estimation of the cultural indicators. Levels of education have considerable bearing on parenting values (cf. Appendix Tables B.4 and B.5).

We categorize respondents into three levels of education (Primary school: ISCED codes 1–2; Secondary education: ISCED codes 3–5; University degree: ISCED codes 6–8). We calculate average scores for the Authoritativeness and Permissiveness dimensions defined by the country-specific surveys and the six-fold categorization defined by education levels and a birth year cut-off of 1970. We use information on immigrants' country of origin, the 1970 cut-off and education level, and merge the individual-level parental data with the corresponding statistics derived from the survey data.

Table 1. Summary statistics

Individual-level variables

	One immigrant parent			Two immigrant parents		
	Mean	Sd.	N	Mean	Sd.	N
Math performance in 8th grade	0.07	1.01	45,337	-0.25	0.99	26,177
Math performance in 5th grade	0.04	1.01	50,328	-0.31	1.02	30,380
Math performance exam 10 th grade	0.06	1.02	14,002	-0.13	1.00	7,952
Reading in Norwegian performance 8 th grade	0.11	0.98	45,054	-0.40	0.99	26,058
Reading in Norwegian performance 5 th grade	0.09	0.99	50,016	-0.40	1.00	30,181
Norwegian performance exam 10 th grade	0.12	1.02	12,495	-0.21	0.93	7,304
Reading in English performance 8 th grade	0.28	0.98	45,275	-0.10	1.00	26,116
Reading in English performance 5 th grade	0.29	1.03	45,178	0.00	1.04	27,300
English performance exam 10 th grade	0.11	0.99	13,981	-0.2	0.99	7,697
Academic track (=1)	0.71	0.45	14,925	0.74	0.44	8,301
Theoretical math (=1)	0.35	0.48	14,925	0.38	0.49	8,301
Student gender (Boy = 0, Girl = 1)	0.49	0.50	99,169	0.49	0.50	59,106
Father's income	47.21	54.49	52,192	32.76	32.64	59,106
Mother's income	32.70	27.11	50,326	20.29	21.89	59,106
Mother's age	41.89	5.40	52,057	40.42	5.53	59,099
Father's age	44.40	6.99	51,117	45.51	6.65	57,976
Mother employed (=1)	0.89	0.31	50,326	0.70	0.46	59,106
Father employed (=1)	0.92	0.28	52,192	0.79	0.41	59,106
Parents married (=1)	0.56	0.50	99,169	0.71	0.45	59,106
Parents divorced. Child lives with mother (=1)	0.21	0.40	99,169	0.17	0.37	59,106
Parents divorced. Child lives with father (=1)	0.05	0.22	99,169	0.02	0.14	59,106
Cohabitants with common child (=1)	0.13	0.34	99,169	0.05	0.22	59,106
Other families	0.05	0.21	99,169	0.04	0.21	59,106
Refugee status (=1)	0.03	0.17	99,169	0.36	0.48	59,106
Number of siblings	1.88	1.29	99,169	2.44	1.60	59,106
Parity	1.78	0.97	99,169	2.22	1.33	59,106

Notes: The summary statistics display information on the schooling performance of students are born in Norway (i.e., second-generation immigrants) with at one or two parents born in a foreign country. The descriptive statistics covers test scores in grades 5 and 8 over the years 2007–2015, exam results in the 10th grade and choice of track and math specialization in upper secondary school. Test scores and exam results are measured on a standardized scale with a mean of zero and a standard deviation of one. Academic track and theoretical math are dummy variables indicating whether students choose academic track (=1) and theoretical mathematics (=1) respectively. Income is measured at the annual pre-tax wage incomes (measured in 10,000 NOK at current prices). Employment is a dummy variable (=1) if the parents receive positive working income. Refugee status is a dummy variable if at least one of the student's parents came to Norway as a refugees (=1), and 0 otherwise (i.e., family reunion or work). Additional variables indicate whether the parents are married, divorced (student lives with mother or father) or cohabitants. Students with single parents are reference group. Parity indicates student birth order.

Table 1 cont. Summary statistics

Education level

<i>Father's education level:</i>	One immigrant parent			Two immigrant parents		
	Mean	Sd.	N	Mean	Sd.	N
Primary school (6–7 years)	0.01	0.10	52,192	0.04	0.20	59,106
Lower secondary school (9–10 years)	0.16	0.36	52,192	0.29	0.45	59,106
Incomplete secondary education (11–12 years)	0.06	0.24	52,192	0.06	0.25	59,106
Complete secondary education (13–14 years)	0.22	0.41	52,192	0.23	0.42	59,106
Complete secondary education (14–15 years)	0.02	0.14	52,192	0.02	0.14	59,106
University lower degree	0.24	0.43	52,192	0.17	0.37	59,106
University higher degree	0.13	0.34	52,192	0.06	0.25	59,106
PhD degree	0.03	0.16	52,192	0.02	0.13	59,106
Missing observations	0.13	0.33	52,192	0.10	0.31	59,106
<i>Mother's education level:</i>	Mean	Sd.	N	Mean	Sd.	N
Primary school (6–7 years)	0.02	0.14	50,326	0.05	0.22	59,106
Lower secondary school (9–10 years)	0.15	0.36	50,326	0.34	0.47	59,106
Incomplete secondary education (11–12 years)	0.05	0.21	50,326	0.05	0.22	59,106
Complete secondary education (13–14 years)	0.21	0.40	50,326	0.22	0.41	59,106
Complete secondary education (14–15 years)	0.02	0.13	50,326	0.01	0.10	59,106
University lower degree	0.35	0.48	50,326	0.16	0.37	59,106
University higher degree	0.13	0.34	50,326	0.04	0.20	59,106
PhD degree	0.02	0.15	50,326	0.01	0.09	59,106
Missing observations	0.06	0.24	50,326	0.11	0.32	59,106

Note: Education by the NUS2000 standard (Norway), being compatible with the OECD-ISCED scale. The table provides information on the share of students having parents with different levels of education based on the ISCED scale. Missing observation is the share of students with parents missing information on education. In the analyses, these are given value 1.

5. Research strategy

The “epidemiological” approach allows us – in principle – to isolate the influence of parental culture from other influences. The assumption is that immigrant parents with a ‘productive’ parenting style originate from countries with a ‘productive’ parenting culture, and that children are exposed to parenting strategies corresponding to those applied in the parents’ country of origin. At the same time, immigrant parents from different countries face similar economic, institutional, and educational conditions when they settle a new country.

Students born in Norway with immigrant parents

We analyze the school performance of students born in Norway with one or two parents born in the country of ancestry. A first reason for selecting on these students is that students who have lived part of their (early) lives in the parents’ country of origin have been subjected to non-parental cultural stimuli. These influences make it hard to identify the effects of parents on the students’ school performance. Many students born in Norway are exposed to cultural impulses from the parents’ country of origin (phone, social media, vacation, watching TV, etc.). The extent of these contacts is endogenous; parents wanting to raise their children in line with norms in their homeland will facilitate these impulses. Others will shield their children from these influences. A second reason is that students born in the country of ancestry may have been subjected to traumatic experiences and adverse health conditions. This is particularly relevant for refugees, and it might have affected these students’ cognitive abilities negatively.

Self-selection, assimilation and attenuation bias

Immigrant preferences might not be representative for the population in their country of origin. A first concern is that immigrants might move to Norway as consequence of having parenting preferences deviating from the country of origin, and being closer to the preferences of Norwegian natives. This pattern appear to be consistent with Docquier et al. (2020), who find that aspiring immigrants to high-income countries from countries in the Middle East and North Africa display lower levels of religiosity and value gender equality higher. Value-based self-selection would cause a convergence of values in our data, which would bias in estimates downwards. We present a series of robustness test showing that self-selection is unlikely to overstate the importance of our cultural indicators (see discussion below).

Secondly, cultural values are not necessary a very persistent characteristic (for review, see Fernandez

2011:484-485). Immigrant parents might to adopt Norwegian-style parenting values as consequence of the new labor market conditions, especially the low levels of wage dispersion and income disparity (Doepke and Zilibotti 2017). Rapid assimilation would cause immigrants' parenting styles behavior to converge, which would also bias our epidemiological estimates towards zero. In addition, the influence that immigrant parents have on their children might be diluted by the values held by the native population. Children of immigrant parents observe the behavior, values and beliefs of their student friends. The moderating effect is likely be larger when values diverge considerably, which would produce a downward bias on estimates.

Related to these concerns is that immigrant values are measured by calculating of source country averages (conditional on cohort and education levels) using relevant indicators. The use of these cultural proxies could lead to attenuation bias in our epidemiological estimates, particularly when the immigrants come from culturally diverse societies. We therefore agree with Fernandez's (2011:491-496) assessment, that the epidemiological approach are likely to yield lower-bound estimates of cultural effects.

The baseline model

Y_{ikc} is a generic indicator the students' school performance, i denotes student, k represents the school identification, and c is the country-of-origin. Performance has been measured by the test scores in the 5th and 8th grade, as exam results in math at the 10th grade, whether students attend the academic track (=1) or the vocational track (=0) in upper secondary school, and given that they chose the academic track, whether they chose advanced math (=1) or ordinary math.

$$Y_{ikc} = \beta_1 Authoritativeness_c + \beta_2 Permissiveness_c + X_{ikc}\vartheta + \psi_t + \theta_k + \epsilon_{ikc}$$

Our hypotheses are that $\beta_1 > 0$, and that $\beta_2 < 0$. This baseline regression model has been estimated separately for students with one versus two immigrant parents (both having the same country of ancestry). Notation indicating whether the student has one or two immigrant parents has been suppressed in the regression formalization. The cultural indicators are expected to have larger effects for students with two immigrant parents. The baseline model includes student and parent level controls (X_{ikc}), year fixed effects (ψ_t), school fixed effects (θ_k) and an idiosyncratic error term (ϵ_{ikc}).

School selection in Norway

As we described above, Norway has an unusually standardized public school system; nearly all students attend the nearest school, and enrollments in private schools are trivial. Nevertheless, ambitious parents may opt out of municipalities or school catchment areas with low-quality schools and settle in areas where published tests scores are higher (Black 1999; Fiva and Kirkebøen 2011). Teacher quality and levels of human capital might correlate with students' cultural background and school performance. Including school fixed effects (θ_k) means that we estimate within-school effects of our cultural proxies (cf. Figlio 2019:284). This alleviates concerns related to human capital embedded in the neighborhood.¹²

Individual-level measures of parents' human capital

A key challenge is that parents coming from different cultures differ with respect to relevant human capital indicators, which is essential for students' school performance. We employ extensive controls to account for such influences, the most important being mothers' and fathers' education levels (cf. Table 1). The register data allow us to control education level by the eight-point scale defined by the ISCE (International Standard Classification of Education). Missing values on (parental) education classification has been included as a separate category. "Missing" is mostly a consequence for immigrants who have not finished formal schooling. We also include controls for parents' success in the Norwegian labor market to account for other pre-determined parental skills, which might also influence children's school performance. Our data allow us to identify reasons for settling in Norway, and we differentiate between refugees and work immigrants. Parents in the latter group may be better qualified.

Supplementary model specifications

The baseline identification strategy is strong with respect to reverse causality; students' educational performance cannot influence the prevailing cultural values in their parents' country of origin. Crucially, the epidemiological model assumes that relevant non-cultural parental characteristics (particularly measures of parental human capital) can be included as observable control variables. Any omitted country-of-origin characteristic will bias causal estimates if it correlates with the parenting indicators and schooling performance. For example, the linguistic distance between immigrants'

¹² The arrival of immigrant students to a school or a class could affect the school performance of non-immigrants. In our context, a 'positive' cultural shock as consequence of immigration from a particular country might improve the schooling results of natives, while a 'negative' shock could lower performance. A limited number of studies indicate that these spillovers are small (for review, see Card 2013).

mother tongue and Norwegian might affect parents' ability to fit into the new society and raise their children. Another example is skin color. Parenting values might correlate with complexion, and students might be treated depending on their skin color. Such lists of potential confounders are endless.

We alleviate this worry in two ways. First, we add initial student performance as a control variable, which picks up much of early-year parental influences. Importantly, parents might have a stronger bearing on students' skills in the early stages of the schooling, and possibly lesser influence on developments thereafter. At the same time, we would expect students' "cultural programming" to exert a persistent influence. Students with a background from a learning-oriented culture should have better progression from the lower to higher levels of schooling, conditional on initial school results.¹³

Second, we exploit variation in the parenting impetus as consequence of students having one versus two immigrant parents. Mixed native-immigrant couples are likely to display different cultural orientations than parents from the same country of origin. Positive assortative mating based on cultural orientation suggests that the immigrant parent adheres to "native values". Pointing in the same direction is that intercultural marriage is a signpost of assimilation. Immigrants who find a spouse in the majority population are likely to become better integrated into the community. Assuming that the cultural impulse is lower for students with one immigrant and one native parent, we can estimate models with country of origin fixed effects.

¹³ For example, Figlio et al. (2019) suggest that immigrants coming from different countries may display different patterns of assimilation, potentially correlating with school performance. Including a test score outcome at an early stage as a control variable would lessen this concern. We believe that our results for students with only one immigrant parent are less susceptible to such assimilation effects. Students with a native parent are likely to have access to native social networks and speak Norwegian fluently.

6. School performance by country of origin

We start out displaying country-of-origin differences in schooling performance. We employ a regression model using mathematics test scores as response variable and estimate effects of parental country of origin using native students as a reference category. We include control for municipality- and year fixed effects as well as a set of relevant covariates. The test scores are standardized with a mean of 0 and a standard deviation of 1, calculated separately for each year. The model has been estimated separately for students with one and two immigrant parents. Figure 2 displays the country-of-origin fixed effects.

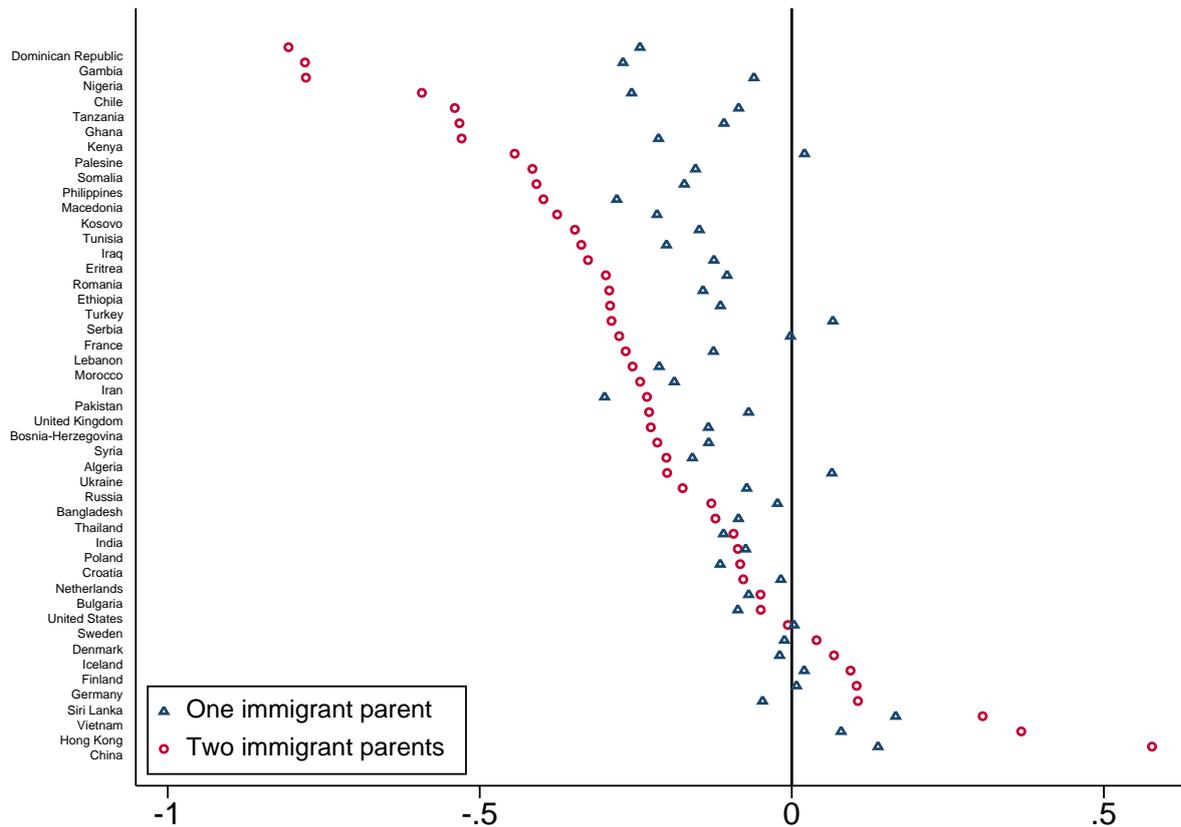


Figure 3. Country-level school performance

Note: The plot displays country-of-origin school performance, measured by math test scores in the 5th and 8th grades. The estimates derive from two separate regressions, one for second-generation immigrant students with two immigrant parents and the other for second-generation immigrant students with one immigrant and one native parent. Both models employ native (Norwegian) students as a reference group, indicated by the vertical line. The models include controls for parental education levels, wage income, reason for immigration (refugee, work-related, family reunion), student gender, number of siblings and parity. The graph includes country-of-origins with at least 50 observations in the two categories (students with one- and two immigrant parents; cf. Table A1).

The results of native students are comparable to those with parents from Sweden, Denmark, Iceland, Finland, the Netherlands and Germany. Students from China, Hong Kong and Vietnam do exceptionally well. Students with parents from the South America, Africa, Central Asia and the Middle East tend to do less well in the math tests. Many of the students from Africa have dark skin and display relatively weak test scores. Yet, the dark-skinned students from Sri Lanka have excellent test scores, on par with students with background from Germany or Finland. This might suggest that teachers' preconceived attitudes related to students' skin color is not a likely explanation for the pattern in Figure 2 (Burgess and Greaves 2013). Most parents from Vietnam and Sri Lanka came as refugees,

while parents from Western Europe came to find work. Students with refugee backgrounds do not necessarily display lower test scores than other immigrants. The estimates in Figure 2 tend to be smaller (in absolute values) for one-immigrant-parent students than for students with two immigrant parents from the same country. The native parent appears to dissipate part of the cultural effect induced by the spouse, both when performance deviations are positive (Vietnam, Hong Kong, China) and when they are negative (Gambia, Chile). In Appendix Figures A.2 and A.3, we present corresponding plots displaying country-level variations for test scores in reading (Norwegian) and English. In Appendix Figure A.4, we plot of the outcomes against each of the cultural indicators using raw country-level data.

Students are assessed at the 9th level using a (national) test with a comparable complexity test as at the 8th level. The annual distribution of the mathematics tests have a standard deviation of about 10 points, and the average student received 4 more points at the 9th level. One year of schooling corresponds to about 0.4 standard deviations, which facilitates our interpretation of estimate magnitudes in Figure 3. Students with two parents from Hong Kong or China have an additional learning progression - relative to students with two native parents - equivalent to about one year of schooling. Some students with immigrant parents lag considerably behind native students, in some cases corresponding to more than one year of schooling.

In Appendix Figure A.5, we display a graph that illustrates the relationship between the estimates using data on students with one- and two-immigrant parents. The two estimates correlate positively; for mathematics, the bivariate correlation coefficients are $r = 0.58$ (unweighted) and $r = 0.74$ (using number of students as weights).

External validity

If immigrants to Norway have cultural values in line with the population in the country of origin, we would expect the country-level estimates to correlate positively with test scores obtained by students living in the homeland (cf. Levels et al. 2008). In Appendix Figure A.6, we display a plot where the country-level estimates (i.e., a complete set of estimates) are measured on the horizontal axis, while the vertical axis measures the test scores obtained in the TIMSS 2011 and the PISA 2012 studies.¹⁴

¹⁴ The data sources are: a) TIMSS 2011, International results in mathematics (the 4th grade) (Chapter 1), TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College. b) PISA 2012 Results in Focus: What 15-year-olds know and what they can do with what they know, OECD 2014. Appendix Figure A.6 employs the mean scores for individual countries. The bivariate correlation between the PISA- and TIMSS-indicators of mathematics performance is 0.874.

The bubble sizes are proportional to the number of immigrant students used to estimate the baseline regression model. The plot indicates a positive relationship between the international test scores and the estimates obtained in the Norwegian national tests. For example, a regression with PISA and TIMSS math scores as response variables indicates an R-square test statistic of 0.55 and 0.45 respectively for students with one immigrant parent, 0.49 and 0.26 respectively for students with two immigrant parents.¹⁵ This indicates a high degree of external validity in the cross-national pattern observed in Figure 2.

¹⁵ The two regressions are estimated with number of students as weights, i.e. as "analytic weights" in STATA terminology.

7. The baseline estimates of parenting styles

In Table 2, we present the estimates using our baseline model specification. The dependent variables are test scores at the 5th grade and 8th grade levels, exam results in 10th grade, choice of the academic track in upper secondary school, and the choice of theoretical math course at upper secondary school.

The estimates are strikingly consistent for students with two immigrant parents; the Authoritativeness indicator has a positive effect on test scores and exam results; Permissiveness has a negative effect. This applies to math, reading in Norwegian and in English. Similar to Figlio et al. (2019: 285), we obtain larger estimates (in absolute values) for the mathematics tests scores than for scores in reading. Authoritativeness appears to increase the likelihood of students choosing an academic track and theoretical math in higher secondary education, while permissiveness lower the probability of these choices. Note that the test score estimates are more precisely estimated than exam results and specialization choices as consequence of larger number of observations.

The estimates go in the same direction for students with one immigrant parent, but the estimated effects are mostly smaller in absolute values. For example, a one-standard deviation increase in Authoritativeness produces a math test score increase of 0.18 standard deviations when the student has two immigrant parents, and 0.07 for students having one immigrant parent only. For test scores and exam results in reading, the estimated cultural effects are very small and not significant. This corroborates our expectation that the influence of immigrant culture is diluted when students are brought up with a native mother or father.

The estimated effects of parenting styles are substantial when we compare with the effects of parental education levels.¹⁶ A higher university degree (master degree) for generates a test score increase of roughly 0.4 standard deviations relative to lower secondary education (10 years of compulsory education). The estimated effect of Authoritativeness on math performance corresponds to nearly half the effect a higher university degree, and the Permissiveness effect corresponds to about one third of the parental education effect. Moreover, assuming that 0.4 standard deviations corresponds to one year of schooling (cf. Section 6), the (standardized) effect of Authoritativeness on the mathematics score corresponds to nearly six months of schooling.

¹⁶ The relevant estimates for education levels are presented in Appendix Table B.5.

Table 2: Culture and school performance. Baseline estimates

Panel A								
	Two immigrant parents				One immigrant parent			
	I	II	III	IV	V	VI	VII	VIII
	Math score 5th and 8th grade	Exam results math 10th grade	Choice – Academic track	Choice - theoretical math	Math score 5th and 8th grade	Exam results math 10th grade	Choice – academic track	Choice - theoretical math
Permissiveness	-0.142** (0.0658)	-0.296*** (0.0762)	-0.0334** (0.0152)	-0.108*** (0.0318)	-0.00162 (0.0127)	-0.0143 (0.0217)	-0.0131** (0.00595)	-0.0111 (0.00864)
Authoritativeness	0.177*** (0.0442)	0.227*** (0.0652)	0.00798 (0.00917)	0.0800** (0.0212)	0.0726*** (0.0154)	0.0871*** (0.0247)	0.0162** (0.00749)	0.0280** (0.0107)
R-squared	0.222	0.308	0.149	0.173	0.217	0.333	0.190	0.193
Number of students	40,815	3,762	5,011	5,011	84,973	8,039	10,851	10,851
Number of countries	97	75	76	76	99	93	94	94
Panel B								
	Two immigrant parents				One immigrant parent			
	IX	X	XI	XII	XIII	XIV	XV	XVI
	Reading in Norwegian score 5th and 8th grade	Reading in English score 5 th and 8 th grade	Exam results Norwegian 10 th grade	Exam results English 10 th grade	Reading in Norwegian score 5th and 8th grade	Reading in English score 5 th and 8 th grade	Exam results Norwegian 10 th grade	Exam results English 10 th grade
Permissiveness	-0.0375 (0.0471)	-0.0977** (0.0422)	-0.148*** (0.0392)	-0.0789** (0.0361)	0.00387 (0.0101)	-0.0548 (0.0334)	-0.00634 (0.0147)	-0.0243 (0.0271)
Authoritativeness	0.112*** (0.0327)	0.0690* (0.0383)	0.0754*** (0.0263)	0.104* (0.0573)	0.0476*** (0.0130)	-0.0338 (0.0424)	0.0245 (0.0169)	-0.000900 (0.0264)
R-squared	0.239	0.229	0.285	0.293	0.198	0.174	0.295	0.267
Number of students	39,989	37,914	3,451	3,637	82,915	78,886	7,150	7,979
Number of countries	97	97	78	71	99	99	94	94

Notes: The table shows the estimated effects of parenting values on educational outcomes, covering second-generation students with one- and two immigrant parents. The upper panel (A) displays estimates on test scores and exam results in mathematics and specialization choices at the secondary school level. The lower panel shows estimates on test scores and exam results in reading in English and Norwegian. The test score and exam results are standardized variables with a zero mean and a standard deviation of one. The specialization choices are dummy variables. The table includes student-level controls for grade level (relevant for test scores only), gender, birth order (parity), and number of siblings, and parental control for marriage status, reason for immigrating to Norway, education levels, wage income, work participation, and age. Notes to Table 1 provide further information on these variables. The models are estimated with school fixed effects and fixed effects for the years when the tests or exams were conducted. Permissiveness and Authoritativeness are also standardized variables with a zero mean and a standard deviation of one. The standard errors are clustered on country of origin.

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

The test score estimates (Table 2, column I) help us relate to the country-level differences displayed in Figure 3. For example, students with parents coming from Vietnam obtains a math test score about 0.3 standard deviations better than native students do. The Vietnam - Norway difference in Authoritativeness is negligible, while the difference in the Permissiveness scores is about 1 standard deviation. The Permissiveness estimate is -0.14, suggesting that about half the test score difference can be explained by parenting styles. Similarly, students with background from Germany and Chile display similar values on the Permissiveness dimension, but the students with background from Germany have considerably higher scores on Authoritativeness. This explains part of the better math performance of the students with parents from Germany.

8. The robustness of baseline estimates

The online Appendix presents a series of robustness checks on the results presented in Table 2. We restrict these tests to analyses of test score data for students with two immigrant parents.¹⁷

Separate effects for the parenting indicators

We start out presenting estimates based on regression models where the indicators are entered separately in the regression models. We display the estimates in Appendix Table B.6, which shows consistent negative estimates for Permissiveness and positive for Authoritativeness. As to be expected given the positive correlation of the two parenting indicators, the point estimates are somewhat larger than those presented in Table 2.

Post-treatment confounders

It can be argued that variables measuring the parents' human capital (parent education levels, work participation, wage income) and school choices are endogenous outcomes, and should not be included as controls (for discussion, see Fernandez 2011: 495). In Appendix Table B.7, we therefore present additional estimates for students with two immigrant parents. The first column (I, IV, VII) yields estimates where we only control for student characteristics, the second (II, V, VIII) adds controls for parents human capital (education levels, labor market outcomes, family situation), and the final column (III, VI, VIII) includes school fixed effects (similar to Table 2). The estimates for Authoritativeness are positive, and estimates for Permissiveness are negative in all specifications except one. For mathematics, the Individual level controls yields a lower estimate for Authoritativeness, and a larger, negative estimate for Permissiveness. This is because human capital – particularly education levels - are positively correlated with school performance as well as the two cultural indicators. We see the same pattern when analyzing the English test scores, and to a lesser extent also for reading Norwegian.

The mediation effect of parental human capital

If we accept that measures of parental human capital should be seen as post-treatment confounders, it is interesting to estimate the direct effect of the cultural indicators. The indirect causal path has two links: Firstly, parents' education levels might be influenced by the cultural orientation in the country of ancestry. Secondly, well-educated parents could have a comparative advantage in inspiring their

¹⁷ The summary statistics are presented in Appendix Tables B.2.

children to take education seriously. The children of better-educated parents could also have higher returns to education as consequence of inherited abilities (Doepke and Zilibotti 2017: 1345).

Controlling for mothers and fathers education levels, work participation and earnings in a standard regression model can generate biased estimates of direct causal effects. Following Acharya et al. (2016), we estimate the direct effects of Authoritativeness and Permissiveness using the sequential g-estimation approach.¹⁸ In Appendix Table B.8, we display the direct effects estimates. Overall, the direct effects of Authoritativeness are comparable to the estimates presented in Table 2, suggesting that the indirect, causal path is small. The negative estimates for Permissiveness are somewhat larger than in Table 2. A permissive style tend to involve parents with higher levels of human capital, which reduces the detrimental effects of permissive parenting.

The operationalization of parenting styles

To check the robustness of our measurement model, we present three alternative approaches. The first employs plain country-level averages of the two value dimension (rather than conditioning on birth year and education levels), the second defines Authoritativeness and Permissiveness by the factor indexes for the principal component analyses, and the third estimates the partial effects of the four key indicators – independence, obedience, imagination and hard work. The estimates are presented in Appendix Tables B.9, B.10 and B.11 respectively. Simple averages and factor indexes yield estimates similar to those presented in Table 2. In Table B.11, independence yields a consistent positive estimate, while the obedience-estimates are mostly negative and less precise. Imagination appears to have a generally negative effect, while the estimates for hard work are positive. This pattern is more apparent for mathematics test scores than for the scores in Norwegian and English reading.

Human capital traits related to parents' country-of-origin

Though we believe the individual-level characteristics included in Table 2-regression models go a long way in accounting for parental human capital, we present further analyses that account for additional country-of-origin features.

¹⁸ This method employs a first stage regression model to ‘demediate’ the response variable, which in the current case implies that the effects of the human capital indicators (the mediators) are subtracted from the school performance indicator (the response variable). Using the estimates in the test score regression models in Table 2, we subtract the effects of mothers and fathers education levels, work participation and earnings from the response variable. In the second step, we estimate the effects of the cultural indicators on the demediated test scores. This procedure requires a strong assumption of selection of observables (‘sequential unconfoundedness’), that we have no omitted variables relevant to the cultural effects and for the human capital effects on the outcome.

Immigrant parents are a positively selected from to the country of ancestry when they have a higher education levels than corresponding parts of the nonimmigrant population (Figlio et al. 2019: 289; Feliciano 2005). We define an index of educational selectivity defined as by the identical classifications defined in the Statistics Norway survey data and the World Value Survey/European Value Survey (the 8-level ISCED scale). We compare the education levels of immigrant parents (measured by Statistics Norway register data) with the corresponding education levels in the country of origin, defined by respondents aged 30-50¹⁹, and measured separately for parents born before and after 1970. Immigrant parents to Norway are assigned a value 1 if (s)he has a higher level of education than the median person in the country of origin, 0 if (s)he if the education level corresponds to the median education level, and -1 if the education level is lower than the median. Educational selectivity is defined by the country-level averages of these individual-level scores.

We also estimate cultural effects controlling for GDP per capita (measured in PPP), share of children with low birth weight (which is relevant for subsequent cognitive developments; see Black et al. 2007) and an indirect measure of the schooling quality of the country of origin. The latter is due to Schoellman (2008: 390), who analyzes data on foreign-educated immigrants to the US and Canada and estimates an augmented Mincer regression that allows the effects of years of schooling to vary by country of origin. These estimates of returns to schooling suggest that countries produce very different levels of human capital per year of schooling. These estimates can be interpreted as measures of school quality in parents' country of origin. We define quality-adjusted years of schooling by the product of reported average years of schooling for the student's parents (estimated based on the ISCE classification) and the country-level Schoellman estimates. The estimates presented in Appendix Table B.12 indicate that including these controls have little bearing on the parenting estimates.

Cultural traits related to parents' country-of-origin

One might argue that 'deep' cultural traits might influence parenting styles as well as students' school performance. Therefore, the estimates reported in Table 2 might not represent causal effects. For example, immigrant parents might be more inclined to apply an authoritative style when they came from societies that value long-term orientation (cf. Figlio et al. 2019) or trust in other people (Knack and Keefer 1996; Algan and Cahuc 2010; Falk et al. 2018). To test this conjecture, we add the entire

¹⁹ We do not adjust educational selectivity for age since we observe parents when children have reached the 5th grade level at the age of 11. Nearly all these parents are 30 years of age or older, and adjusting for age is therefore pointless.

set of Hofstede (2010) cultural dimensions (including long-term orientation and trust) as control variables in the Table 2-regressions. We report the parenting estimates in Appendix Table B.13, and they do not deviate much from those presented in Table 2.

Replication of Figlio et al. (2019)

Figlio et al. (2019) show that students originating in long-term oriented cultures perform better. We compare the estimates for the Florida school system with estimates relying on the Norwegian dataset, and using the same index of long-term orientation (LTO). The estimates presented in Appendix Table B.14 show that the sign and the magnitude of our LTO-estimates are quite similar (see Figlio et al. 2019, the ‘beta’ estimates presented in Table 2). Falk et al. (2018) present a related indicator – *patience* – derived from laboratory experiments in 76 countries. We present estimates using patience as an alternative indicator of long-term orientation. This (standardized) indicator displays a stronger, positive relation to educational outcomes, which might indicate that lab-measures yield better measures of underlying time preferences.

The mathematics gender gap

Following the literature on the gender gap in mathematics (Nollenberger et al. 2016; Alden and Neuman 2019; Ericson 2019), we estimate models with sibling fixed effects. The fixed-effects model comprises our two indicators of parenting style, which are interacted with student gender. The estimates presented in Appendix Table B.15 document that girls (on average) obtain lower mathematics test scores than boys, about 0.19 standard deviations. The parenting indicators display point estimates close to zero. Estimate precision is acceptable, suggesting that the two parenting styles produce similar effects for girls and boys. We get comparable estimates when we replace sibling fixed-effects with country-of-origin fixed effects.

A placebo test using data on adoptees

In a final robustness check, we show that the estimates presented in Table 2 are not an artefact of data or econometrics. The schooling performance of adopted children is useful in a Placebo test since students were raised by native parents, and they were not subjected to the parental styles in their ancestral country. Students born in Norway with Chinese and Korean immigrant parents obtain mathematics higher test scores than native students do. We should not expect to similar country-of-origin effects for students adopted from these countries. We

therefore analyze children born in Korea and China by parents from these countries and were later adopted by two Norwegian parents.²⁰

Appendix Table B.16 displays the estimated effects on test scores for adoptees as well as second-generation students. Native students are used as reference category. Dummy variables capture the "Korean" and "Chinese" effects: the adoptees, and students with one or two immigrant parents from Korea. The regression specification is otherwise similar to the model used to produce Figure 2. Adopted children have marginally lower math test scores than native students. The negative estimates might be due to early life experiences of adoptees. Many spent the first months of their lives in orphanages and might have suffered from lack of stimulation, physical and psychosocial stress and even malnutrition. Chinese children were older at the time of adoption than Korean was, on average 1.2 years of age versus to 0.6 years from Korea. This might account for the larger negative effect for Chinese children.

²⁰ The Korean adoptees were not selected by their parents, but allocated to registered parents on a first-come first-serve basis. Fagereng et al. (2015) yield detailed information on the allocation mechanism, and provide evidence suggesting that allotments were as good as random.

9. Controlling for initial schooling performance

We apply the value-added model to assess the effects of parental inputs to educational production. The response variable is defined by the performance difference over the two points of time ($Y_{ikc}^t - Y_{ikc}^{t-1}$), and we include initial test scores (Y_{ikc}^{t-1}) as a control variable in the regression model:

$$Y_{ikc}^t - Y_{ikc}^{t-1} = \beta_1 \text{Authoritativeness}_c + \beta_2 \text{Permissiveness}_c + \beta_3 Y_{ikc}^{t-1} + \mathbf{X}_{ikc} \vartheta + \psi_t + \theta_k + \epsilon_{ikc}$$

We analyze progression from the 5th grade to 8th grade, and from the 8th grade (measured by test scores) to the 10th grade (measured by exam results). We also analyze the students' specialization choices at the 10th grade controlling for prior test scores. In Table 3, we present value-added estimates for students using dataset with observations of both one- and two immigrant parents.

The overall pattern in Table 3 is similar to what we observed in Table 2: An authoritative parenting style yields better schooling performance, while a permissive upbringing has negative effects. In Column II, the results are comparable, though estimates are less precise. The test scores in the 5th and 8th grades have negative effects, suggesting that better results at the lower levels yield smaller value-added scores at the higher level. Columns III and IV suggest that Permissiveness has a larger effect on the probability of selecting an academic track and mathematics at a more theoretical level. This tentatively suggests that Permissiveness has a larger bearing in explaining education choices at higher levels in the schooling system. The response variables capturing academic track and theoretical math are not defined as differences (columns III and IV), and the lower-level test scores therefore have positive effects. In Appendix Table B.17, we display value-added estimates using models that do not include prior test scores. The estimates for parenting styles are comparable to those presented in Table 3.

Table 3: The value-added model

	Change in math score from 5th to 8th grade	Change in math score from 8th grade to exam in 10th grade	Academic track	Theoretical math	Change in English score from 5th to 8th grade	Change in English score from 8th to 10th grade	Change in Norwegian score from 5th to 8th grade	Change in Norwegian score from 8th to 10th grade
	I	II	III	IV	V	VI	VII	VIII
Permissiveness	-0.0466 (0.0297)	-0.0584** (0.0293)	-0.0101** (0.00499)	-0.0261*** (0.00943)	-0.0391 (0.0318)	-0.00809 (0.0170)	-0.00349 (0.0190)	-0.0349*** (0.0124)
Authoritativeness	0.112*** (0.0291)	0.0772** (0.0301)	0.00488 (0.00567)	0.0255*** (0.00918)	0.0701** (0.0321)	0.0304** (0.0141)	0.0822*** (0.0200)	0.00440 (0.0137)
Two immigrant parents (=1)	0.0336 (0.0438)	0.232*** (0.0394)	0.0743*** (0.00995)	0.119*** (0.0170)	-0.119** (0.0494)	0.00702 (0.0422)	-0.0285 (0.0362)	0.00420 (0.0231)
Previous score 5th grade	-0.566*** (0.0176)				-0.550*** (0.0118)		-0.757*** (0.00890)	
Previous score 8th grade		-0.414*** (0.0140)	0.107*** (0.00565)	0.211*** (0.00648)		-0.303*** (0.0142)		-0.496*** (0.0135)
Observations	38,974	11,817	15,842	15,842	31,620	11,213	37,978	10,235
R-squared	0.270	0.352	0.190	0.297	0.252	0.274	0.259	0.318
Number of countries	100	95	97	97	100	95	100	95

Notes: The table displays estimates of parenting values on student progression and specialization choices, controlling for prior test scores. The dataset covers students with both one and two immigrant parents. The response variables are measured as changes in test scores from the 5th to the 8th grade and changes in 8th grade test scores to 10th grade exam results. We also analyze the specialization choices in upper secondary school. The models comprise school- and year fixed effects as well as the individual-level controls included in the analysis presented in Table 2.

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

10. Country-of-origin fixed-effects

The final analysis employ combined dataset of students having one or two immigrant parents, and we exploit this heterogeneity to estimate the effects of parenting styles in a model with country-of-origin fixed effects. Let Q_{ikc} be a student-level indicator variable equal 1 if both parents are immigrants from the same country, and 0 if one parent is an immigrant and the other is a native Norwegian. We estimate models that includes effects for years (τ_t), schools (σ_k) and country-of-origin (π_c):

$$Y_{ikc} = \omega_1 \text{Authoritativeness}_c Q_{ikc} + \omega_2 \text{Permissiveness}_c Q_{ikc} + \omega_3 Q_{ikc} + \mathbf{X}_{ikc} \boldsymbol{\mu} + \tau_t + \sigma_k + \pi_c + \varepsilon_{ikc}$$

The reference category is defined by students with one native parent, and where immigrant parent originate in a specific country (π_c). These reference students are more exposed to native values. The interaction terms capture the parenting effects as consequence of having two rather than one immigrant parents. We therefore expect $\omega_1 > 0$ and $\omega_2 < 0$. Note that we control for overall effect of mixed marriages (ω_3).

The estimation of causal effects assumes that spouse selection is uncorrelated with parental human capital, conditional on controls. We employ a Mincer regression model to test the identifying assumption.²¹ One-immigrant parents display higher employment rates and work in better-paid jobs (see Table 1). Conditional on the controls in this model (including education level), native-immigrant couples have earnings levels and participation rates on a par with couples coming from the same country of origin (see Appendix Table B.18).

We present the main estimates in Table 4. As to be expected, the estimates for the parenting indicators are smaller than the cross-sectional estimates (Table 2). For mathematics, Permissiveness appears to have a small effect, not being significantly different from zero. The estimate for Authoritativeness is positive, indicating that a more authoritative upbringing yields better school performance outcomes. The estimates for reading Norwegian and English are positive when the indicators are entered separately as well as simultaneously. When both are entered, we see a significant effect of Permissiveness for reading Norwegian of Authoritativeness for reading English.

²¹ Besley et al. (2017) analyze micro-data from Sweden, and demonstrate that the residuals from a Mincer regression (“their earnings score”) correlates positively with cognitive ability (measured by assessments from military drafts).

The fixed effects estimates corroborate our prior results for mathematics and for reading English, particularly with respect to Authoritativeness. The relatively precise and positive estimate for Permissiveness in column VI can be consequence assimilation effects: fluency in the Norwegian language is better when two-immigrant parents allow their children to socialize freely with native students.

Table 4: Models with country-of-origin fixed effects
Mathematics, reading and English test scores in the 5th and 8th grades

	I	II	III	IV	V	VI	VII	VIII	IX
	Math score 5th and 8th grade	Math score 5th and 8th grade	Math score 5th and 8th grade	Reading Norwegian score 5 th and 8 th grade	Reading Norwegian score 5 th and 8 th grade	Reading Norwegian score 5 th and 8 th grade	Reading English score 5 th and 8 th grade	Reading English score 5 th and 8 th grade	Reading English score 5 th and 8 th grade
Two parents (=1)	-0.0597** (0.0279)	-0.0534** (0.0261)	-0.0573** (0.0253)	-0.168*** (0.0291)	-0.179*** (0.0292)	-0.167*** (0.0283)	-0.0258 (0.0266)	-0.0328 (0.0298)	-0.0240 (0.0272)
Permissiveness* Two parents (=1)	0.0222 (0.0264)		-0.0166 (0.0311)	0.0735*** (0.0230)		0.0513* (0.0263)	0.0666** (0.0256)		0.0364 (0.0267)
Authoritativeness* Two parents (=1)		0.0598*** (0.0189)	0.0666** (0.0266)		0.0591*** (0.0218)	0.0381 (0.0251)		0.0666*** (0.0186)	0.0517** (0.0194)
Number of students	126,099	126,099	126,099	123,212	123,212	123,212	114,249	114,249	114,249
R-squared	0.235	0.235	0.235	0.249	0.249	0.249	0.219	0.219	0.219
Number of countries	100	100	100	100	100	100	100	100	100

Notes: The table displays analyses the effects of parenting values on test scores using data on students with one and two immigrant parents. The models estimates the effects of Permissiveness and Authoritativeness conditional on students having two immigrant parents (from the same country of origin), and including country-of-origin fixed effects. “Two parents” is a dummy variable taking the value 1 if the student has two immigrant parents, 0 otherwise. We include individual level controls as in Tables 2 and 3 as well as school fixed effects.

Significance levels: *** p<0.01, ** p<0.05, * p<0.1

11. Conclusions

Norwegian-born students with immigrant parents display substantial differences in test scores when they are classified by country of ancestry. These differences persist after employing extensive controls for family background, including several indicators measuring parents' human capital. The country-of-origin differences go in the same direction for students with one and two immigrant parents, the latter usually being larger. We also see that the country-of-origin disparities correlate positively with the national test scores derived in international tests.

We propose that parenting styles originating in the countries of ancestry account for these differences in school performance. Firstly, an authoritative upbringing that values students' independence, responsibility and determination induces better school results, which is not compatible with demanding child obedience. We expect authoritative parenting to have positive effects on children's school results. Secondly, a permissive parenting style aims at developing students' imagination and tolerance, and does not prioritize hard work. We hypothesize that permissiveness has adverse effects on student performance.

Our first set of results exploits country-of-origin parental differences to map the influence of parental culture on student performance. We focus on students born in Norway, thereby isolating parental influences from the direct country-of-origin effects. The detailed register data facilitate extensive controls for human capital and related parental assets. Next, we include control for students' initial performance, which goes a long way in controlling for unobserved country-of-origin confounders. This value-added approach yields qualitatively similar results. Our last analysis exploits student-level variations in cultural exposure, which facilitates the estimation with country-of-origin fixed effects. The cultural effects are larger for students with two immigrant parents from the same country, and the estimates are broadly consistent with previous results.

Parenting styles have important bearing on student performance. Authoritativeness does improve schooling results. Authoritative parenting implies that children can develop as free individuals, subject to parental influence and support. When parents convince their children that education is important, they will do their best irrespective of being watched and without being rewarded or punished. This result suggests that developing cognitive skills require a degree of intrinsic motivation, not attainable by a dictatorial parenting style (cf. Heckman et al. 2006; Flavio and Heckman 2007; Bettinger et al. 2018). Yet we also find that too much parental lenience – and too little student effort – can harm

school results.

It would be of great interest to explore how parenting strategies affect longer-term outcomes. Accounting for educational outcomes, one might conjecture that a permissive parenting strategy yields better labor market outcomes as consequence of development of individual talents, greater self-confidence and job-motivation as well as improved employer-employee matching. Further research should explore variations in authoritative parenting styles, including the effects of high-intensity 'helicopter parenting'. Support and encouragement are seldom harmful, but excessive parental involvement might induce egocentricity or lack of self-confidence later in life. Research designs are likely to depend on data from natural experiments, and higher-quality epidemiological strategies are conceivable. We would seek fine-grained data on the cultural origins of immigrants, preferably in combination with individual-level data on parenting preferences and behaviors. This information should be linked with data on the children's life histories. In this way, studies could generate new insights about the effects parenting strategies on long-term economic outcomes. Finally, jobs necessitating mathematical qualifications have declined, while we have seen considerable increases in occupations requiring a combination of social and mathematics skills. Recent empirical studies also suggest increasing labor market returns to social skills (Demning 2017). Future research should therefore address the effects of parenting styles on social skills. From a Scandinavian perspective, one would hope that permissiveness enhances work-place interaction in ways that improve productivity, and that such gains are less attainable with an East-Asian parenting style.

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