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Parenting styles 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 their country of origin. Following Doepke and Zilibotti [2017. Parenting with style: Altruism and paternalism in intergenerational preference transmission. *Econometrica*, 85(5), 1331–1371. <https://doi.org/10.3982/ECTA14634>], we measure patterns of parenting using data from the World Value and European Value Surveys. We combine these data with Norwegian register data on students' test scores and exam results. Non-authoritarian parenting styles that encourage hard work (authoritativeness) or allow students to develop their independence and imagination (permissiveness) yield the better educational outcomes.

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JEL

Codes: I21; I24; J24; Z1

- 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

1. Introduction

The results of international student assessments expose large differences in test scores across countries. We observe similar patterns among immigrant students in Norway. These disparities are of immense importance since cognitive abilities have well-documented effects on labor market outcomes as well as on the performance of the entire economy (Hanushek & Woessmann, 2008; Hanushek & Woessmann, 2012). The current paper suggests that parenting styles have substantial bearing on these differences.

Following Doepke and Zilibotti (2017), we define three types of parenting. Authoritarian parents constrain what children can do and value the children's obedience. In contrast, authoritative parents "... attempt to mold their children's preferences, with the aim of inducing choices that parents view as conducive to success in life" (Doepke & Zilibotti, 2017, p. 1232). These parents value

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strategies that motivate their children to work hard. Finally, permissive parents are more lenient, and allow students extensive autonomy to develop independence and imagination.

In the current paper, we assess the effects of the authoritative, authoritarian and permissive parenting styles on school performance. We exploit extensive and detailed data on the educational performance of Norwegian-born students with immigrant parents and estimate causal effects using the epidemiological identification strategy. Our central result is that parents applying authoritative or permissive child-rearing styles have children with better educational outcomes than those who apply an authoritarian style. These results are substantially important for mathematics, while the effects are weaker for languages subjects (Norwegian, English).

The fact that labor market conditions, parenting strategies and student performance evolve together makes empirical analysis challenging. Studies that combine survey data on parental attitudes with test score data offer interesting results, but do not offer credible estimates of causal effects (see for example, Cadena & Keys, 2015; Doepke & Zilibotti, 2017, pp. 1346–1347; Dornbusch et al., 1987; Golsteyn et al., 2014).

We apply the ‘epidemiological approach’ (Fernandez, 2011) and analyze the effects on school performance of students born in Norway with immigrant parents. The paper exploits population-wide register data from Statistics Norway covering the entire immigrant population. The data yields a precise identification of parents and their mother country. We merge the individual-level data with data on parenting styles in the immigrants’ country of origin using survey data from the World Value Survey and the European Value Survey. This allows us to analyze the effects of parenting values on tests scores and exam results and include extensive controls for parents’ human capital, family relationships, reasons for immigrating to Norway, school fixed-effects and several country-of-origin characteristics. We also estimate models where we control for test scores at earlier stages in the educational process, thereby controlling for unmeasured country-of-origin features affecting both parental values and school performance.

The current paper relates to several literatures. The epidemiological approach has been applied to study the effects of culture on various economic outcomes, including work participation (Alesina & Giuliano, 2015; Fernandez & Fogli, 2009), occupational choices (Zhan, 2015) and economic growth (Algan & Cahuc, 2010; Barro & McCleary, 2003; Becker & Woessmann, 2009; Gorodnichenko & Roland, 2017; Granato et al., 1996; Tabellini, 2010). These studies have analyzed the impact of several cultural dimensions, such as the impact of interpersonal trust (see, for example Algan & Cahuc, 2010; Falk et al., 2018; Knack & Keefer, 1997), thriftiness, (Guiso et al., 2006), and individualistic cultures (Gorodnichenko & Roland, 2017).

Another set of studies addresses the impact of schooling outcomes. Levels et al. (2008) analyze mathematics performance using data from the 2003 PISA study. Immigrants doing well in the country of origin tend to get better test scores in the country of destination as well. Similarly, Jerrim (2015) studies mathematics test scores of the children of East Asian immigrants to Australia. These students obtain test results that are substantially higher than their native peers. Nollenberger et al. (2016) and Rodriguez-Planas and Nollenberger (2018) analyze the gender gap in mathematics test scores using data from the PISA program. The position of women has considerable impact on gender differences in test scores. Figlio et al. (2019) analyze data on Florida’s immigrant populations and find that immigrant students with parents originating from countries with a strong long-term orientation tend to display better educational performance.¹

To our knowledge we are the first to analyze the impact of parenting on student performance using the epidemiological approach. The Norwegian setting is particularly useful since a sizeable immigrant population meets a homogenous society with a unitary schooling system. The register data has detailed information on parents’ and students’ schooling performance which facilitates analyses of students growing up in the same neighborhoods, attending the same schools, and getting the same education, but have immigrant parents who apply different styles of parenting.

¹These studies are also related to papers on immigration and the intergenerational transmission of values (Franssen et al., 2019).

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.

2.1. The Norwegian school system

Norway operates a unified schooling system, with primary and upper secondary education being a local government responsibility. All schools are publicly funded, and more than 98% of the students are enrolled in schools owned and managed by the municipal authorities. All schools offer a standardized core curriculum defining common learning content and the same number of teaching hours in each subject. Students are entitled to attend the nearest primary school which means that students from different cultural backgrounds attend the same schools and classes.

Compulsory schooling starts at the age of six and lasts for ten years. The final compulsory school exams are in the 10th 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 they can enroll in upper-secondary education. Students face modest competition at the upper-secondary level; choice of study tracks and of schools depends on students 10th grade level results.

2.2. The school-testing scheme

Starting in 2007 all students take standardized national tests in mathematics, reading in English, and reading in Norwegian in the 5th and 8th grade. The English and mathematics (numeracy) tests are performed on a digital platform, while the reading in Norwegian language test is performed on paper. The national test scores are not used for grading purposes.

2.3. Immigrants and immigration policies

The immigrant population is about 880,000 (2017), or nearly 17% of the total population.² One important group consists of job seekers, mostly from the European Union /European Economic Area (EU/EEA). Another category is refugees, who have been granted permanent residence either as asylum seekers or through the family reunion program.

3. Measuring parenting strategies

We use data from the World Value Survey and the European Value Survey to measure attitudes to parenting. 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.³ The European Value Survey gives us data from 16 additional countries and about 22,000 respondents.

Child-rearing values are measured by a survey instrument:

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

²Statistics Norway defines the immigrant population as persons born abroad with foreign-born parents and Norwegian-born of immigrant parents. This means that immigrants are persons living in Norway and born abroad with two foreign-born parents and four foreign-born grandparents. Norwegian-born with Immigrant parents are born in Norway with two parents born abroad and, in addition, have four grandparents born abroad.

³The 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 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.

In line with Doepke and Zilibotti (2017), we define an authoritarian parenting style by listing obedience as one of the top five child qualities. An authoritative style is defined by *not* subscribing to obedience and at the same time listing hard work. Permissive parenting is defined by *neither* subscribing to obedience nor hard work and at the same time listing independence or imagination. This yields three dummy variables and an almost complete classification of the survey respondents.⁴

For each country we estimated the share of respondents aged 55 or less that subscribed to authoritarian, authoritative or permissive values. By construction, the three country-level parenting indicators are alternative parenting styles. Since the indicators add up to almost unity,⁵ we have effectively two independent pieces of information. In Figure 1, we therefore display country-level values for the parenting values in a two-dimensional ‘triangular’ plot. Countries located near to the corners in Figure 1 have “pure” parenting styles. The country scores are found by drawing lines parallel with the thin, dashed line within the graph. For example, the Scandinavian countries display relatively high scores on permissiveness; China, South Korea and East-European countries score high on authoritativeness, while many countries in Latin America, Africa and the Middle East are located in the “authoritarian corner”.

In Figure A.1, we display the developments in the parenting indicators over the last four decades.⁶ Many countries display developments away from authoritarian parenting focusing on obedience, which is consistent with global shifts towards support for liberal values (Inglehart, 2008; Welzel, 2013). The Scandinavian countries are at the forefront of this development, with an exceptionally steep increase in support for permissive parenting.⁷

4. Register data on students and parents

We analyze data covering the entire population of students born in Norway having one or two parents born outside Norway. Data on students born outside Norway and students with two Norwegian-born parents are *not* used in the empirical analysis.⁸ The students are observed when in the 5th, 8th and 10th grade over the period between 2007 and 2015. The summary statistics in Table 1 cover 158,275 students who have parents from about 100 different countries and who attend 2,961 schools.

⁴As a quality check, we have calculated the parenting indicators using the same sample as Doepke and Zilibotti (2017). The distributions of survey responses are very similar (the numbers in parentheses refer to Doepke & Zilibotti, 2017, p. 1336): We identify 69,909 (66,632) respondents, and classify 33.3% (34%) as permissive, 29.3% (30%) as authoritative, and 26.6% as (27%) authoritarian.

⁵Doepke and Zilibotti (2017, p. 1336) also remark that the non-classified group of respondents is small. The average sum of the three country-level indicators is 0.93.

⁶We present Figures A.1–A.6 and Tables B.1–B.11 in the online Appendix.

⁷Doepke and Zilibotti (2017) argue that parenting strategies develop as rational responses to socio-economic conditions. An authoritarian upbringing works best in static societies where children and parents perform similar types of work. In modern economies, individual talents are best exploited when they are well matched with occupational choices. Using an authoritative parenting style, parents will induce their children to invest in education when the returns to human capital are high. Parents’ education levels are less decisive for the child’s level of education than in many other countries (Black et al., 2005, 2007) and parental income levels in Norway are weakly correlated with children’s incomes (Raaum et al., 2007; Bratsberg et al., 2017). A generous welfare state and modest dispersions in wage levels mean that parents expect their children to get a decent standard of living irrespective of educational performance. Consistent with this description, Figure 1 and Figure A.1 show that many Norwegians value a permissive parenting style.

⁸The only exception is Figure 2 which uses students born in Norway with two Norwegian-born parents as reference category.

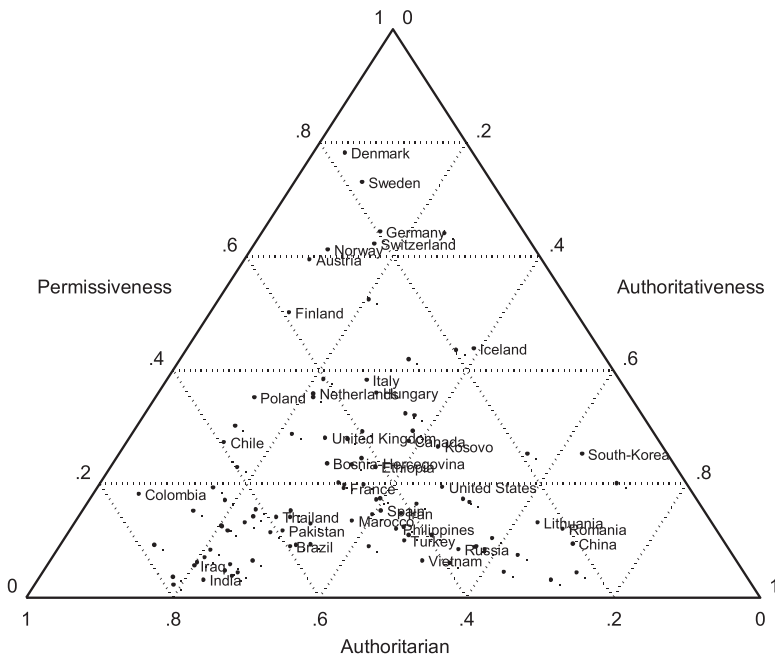


Figure 1. Parenting styles. Notes: The diagram shows country-level averages for the Authoritativeness, Permissiveness and Authoritarian indexes. The data derive from the World Value Survey and the European Value Survey (see text). We display labels for countries with at least 1200 students in the sample. The values of the parenting styles are found by tracking the dashed lines within the triangle. For example, Norway has a value 0.61 on Permissiveness (horizontal line to the left), 0.10 on Authoritativeness (diagonal line upwards to the right) and 0.25 on Authoritarian (diagonal line downwards to the right).

4.1. Data on school performance

In Table 1, we show descriptive statistics for the test scores and exam results in mathematics, Norwegian and English.⁹ The test scores are measured on a scale ranging from 0 to about 50 depending on study year and subject. The exam results are grades measured on a scale from 1 to 6 with higher numbers representing better outcomes. In the regression analyses, we standardize the test scores and exam results with a zero mean and a unit standard deviation. The standardization has been performed separately for each grade-year (for example, for the 8th grade scores in 2008) over the entire sample of students. The data allows us to track the progression of individual students from the 5th to the 8th grade level and from the 8th to the 10th level.¹⁰

4.2. Data on parents

The register data yields information about the parents' country of origin, which therefore allows us to define the three parenting styles at the student level. Table 1 presents shares of students subjected to the authoritarian, authoritative and permissive parenting styles. The data includes extensive information on the students' family at the age of 11, 14 and 16 (corresponding to 5th, 8th and 10th grade). We include information on reasons for immigrating to Norway (work or asylum seeker/refugee), number of siblings, the student's birth order (parity), relations between the parents

⁹The 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.

¹⁰For example, we observe the test scores of individual students in the 5th grade in 2007; these students have reached the 8th grade in 2010 and the 10th grade in 2012. We can observe the 5th to 8th grade progression of students reaching their 5th grade in 2012, while data does not allow us to track progression for the cohort attaining the 5th grade in 2013 or later. Likewise, we cannot observe 8th to 10th grade progression for students reaching the 8th grade in 2014 or 2015.

Table 1. Summary statistics.

	Mean	Sd.	N
Math test score 5th grade	24.47	10.32	80,708
Math test score 8th grade	29.82	13.31	71,514
Math exam 10th grade	3.05	1.27	21,954
Norwegian test score 5th grade (reading)	18.32	7.23	80,197
Norwegian test score 8th grade (reading)	26.06	9.53	71,112
Norwegian exam 10th grade	3.40	0.96	19,799
English test score 5th grade (reading)	26.56	10.74	111,517
English test score 8th grade (reading)	29.09	12.20	120,219
English exam 10th grade	3.87	1.08	21,678
Permissiveness	0.31	0.25	140,316
Authoritativeness	0.29	0.16	140,316
Authoritarian	0.34	0.17	140,316
Student gender (Boy = 0, Girl = 1)	0.49	0.50	158,275
Father's income	39.53	44.83	111,286
Mother's income	25.99	25.20	109,430
Mother's age	41.14	5.52	109,197
Father's age	45.05	6.57	108,035
Mother employed (=1)	0.82	0.38	158,275
Father employed (=1)	0.87	0.34	158,275
Parents married (=1)	0.62	0.49	158,275
Parents divorced. Child lives with mother (=1)	0.19	0.39	158,275
Parents divorced. Child lives with father (=1)	0.04	0.19	158,275
Cohabitants with common child (=1)	0.10	0.30	158,275
Other families (=1)	0.05	0.21	158,275
Refugee status (=1)	0.15	0.36	158,275
Number of siblings	2.09	1.44	158,275
Parity	1.95	1.14	158,275
Two immigrant parents (=1)	0.37	0.48	158,275

Notes: The summary statistics display information on the schooling performance of students born in Norway (i.e., second-generation immigrants). The table covers test scores in grades 5 and 8 over the years 2007–2015, exam results in the 10th grade in the years 2009–2015. Permissiveness, Authoritativeness and Authoritarian are variables derived from the World Value Survey and the European Value Survey, using data after the year 2000. These variables are defined by the parents' country of origin, and the statistics displayed refer to the individual students. Parental income levels are measured as the annual pre-tax wage income (measured in 10,000 NOK at current prices). Employment is a dummy variable (=1) defined by parents receiving a positive working income, and 0 otherwise. Refugee status indicates whether one or both the student's parents came to Norway as a refugees (=1), and 0 otherwise (i.e., family reunion or work). The students' family situation are defined by parents being married, divorced (student lives with mother or father) or cohabitants. Parity indicates student birth order. Two immigrant parents is a dummy variable (=1) if the student has two immigrant parents, and 0 if the student has one native and one immigrant parent.

(married, divorced, cohabitants), and mothers' and fathers' age. Parents' human capital is measured by detailed information on education levels and labor market outcomes (work experience, wage income).¹¹ Tables B.1–B.4 provide additional summary statistics.

In [Figure 2](#) we display country-of-origin disparities in students' math performance measured as standardized test scores in the 5th and 8th grade and measured as deviations from the test scores obtained by students with two Norwegian-born parents (indicated by the vertical dashed line).¹² We also show corresponding estimates from a regression model with country-of-origin fixed effects using students with two Norwegian-born parents as reference group. This model includes controls for parents' human capital, family situation and student characteristics as well as school and year fixed effects (cf. the specification applied in [Table 2](#)).

[Figure 2](#) indicates large variations across students with diverse backgrounds. Students with parents from Chile obtain a score more than half a standard deviation below the native students,

¹¹Families with one immigrant parent are better educated and parents in these one-immigrant families collect higher wages and have a higher probability of being employed than families with two immigrant parents.

¹²The plot uses data for students with one or two immigrant parents. We have estimated test scores by country of origin separately for the two groups, and estimates are highly correlated. For example, for the correlation for the residualized math test scores is 0.58 (unweighted) and 0.74 (using number of students as weights).

Table 2. Parenting styles and educational performance.

	Math score 5th and 8th grade I	Exam results math 10th grade II	Reading score 5th and 8th grade III	Exam results Norwegian 10th grade IV	Reading in English score 5th and 8th grade V	Exam results English 10th grade VI
Permissiveness	0.417*** (0.0918)	0.432*** (0.152)	0.261*** (0.0698)	0.162** (0.0746)	-0.205* (0.105)	-0.0908 (0.108)
Authoritativeness	0.522** (0.211)	0.714** (0.331)	0.232 (0.147)	0.274* (0.145)	0.217 (0.223)	0.0590 (0.214)
Number of students	128,077	12,165	125,162	10,942	118,979	11,946
Number of countries	100	95	100	97	100	95
R-squared	0.218	0.297	0.237	0.274	0.192	0.253

Notes: The table shows the estimated effects of parenting values on test scores and exam results in mathematics, Norwegian and English. The Authoritative parenting style is used as reference category. The summary statistics displayed in Table 1 provides details on the dataset and variable definitions. The response variables are standardized with zero mean and unity standard deviation. The regression models include controls for number of immigrant parents, grade levels (5 vs 8), student gender, birth order (parity), and number of siblings as well as parents' marriage status, education levels, wage income, work participation, refugee status and age. The models are estimated with school fixed effects and fixed effects for the years when the tests or exams were conducted. Appendix Table B.5 presents the full results. The standard errors (in parentheses) are clustered on country of origin. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

while students with Swiss background attain scores about 0.7 standard deviations above the natives. The residualized differences are smaller, but still substantial. In Figure 2 we see that the students with Chinese origin get the highest residualized test score, about 0.4 standard deviations above the level reached by native students. Students with parents from Colombia attain scores about 0.4 standard deviations below the natives.

To put these numbers in perspective, we can exploit that the mathematics tests conducted at the 8th and 9th grade have comparable degrees of difficulty. As measured on the original scale, the average student received 3.4 additional points at the 9th level math test. The standard deviation of the test is about 12 points, suggesting that 0.3 standard deviations correspond to one year of schooling.¹³ This implies that the residualized Columbian-Chinese difference represents the learning effect of more than two study years. In Figures A.2 and A.3, we present corresponding plots displaying country-level variations for test scores in Norwegian and English. Unsurprisingly, students of English-speaking decent display top scores in English, and having a European language background appear to be an advantage for the Norwegian language results.¹⁴ A study by Böhlmark (2008) underscores the importance of language barriers. Using Swedish data, he finds that immigrant students' age-at-immigration affects performance negatively, but has lesser bearing on the mathematics results. We therefore highlight the mathematics results as being arguably equally "strange" irrespective of ancestral background.

4.3. External validity

A key assumption is that immigrant parents in Norway have values in line with the population in their country of origin. We would therefore expect the country-level estimates in Figure 2 to correlate positively with test scores obtained by students living in the homeland (cf. Levels et al., 2008).

¹³Using data for 2014, we find that the 8th grade math test had an average score of 25.7 and a standard deviation of 11.9. The corresponding test at the 9th grade had an average of 29.1 and a standard deviation of 12.6. The average learning gain of 3.4 accounts for 0.278 standard deviations.

¹⁴The dark-skinned students from Sri Lanka have 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 cross-national pattern displayed in Figure 2 (Burgess & Greaves, 2013).

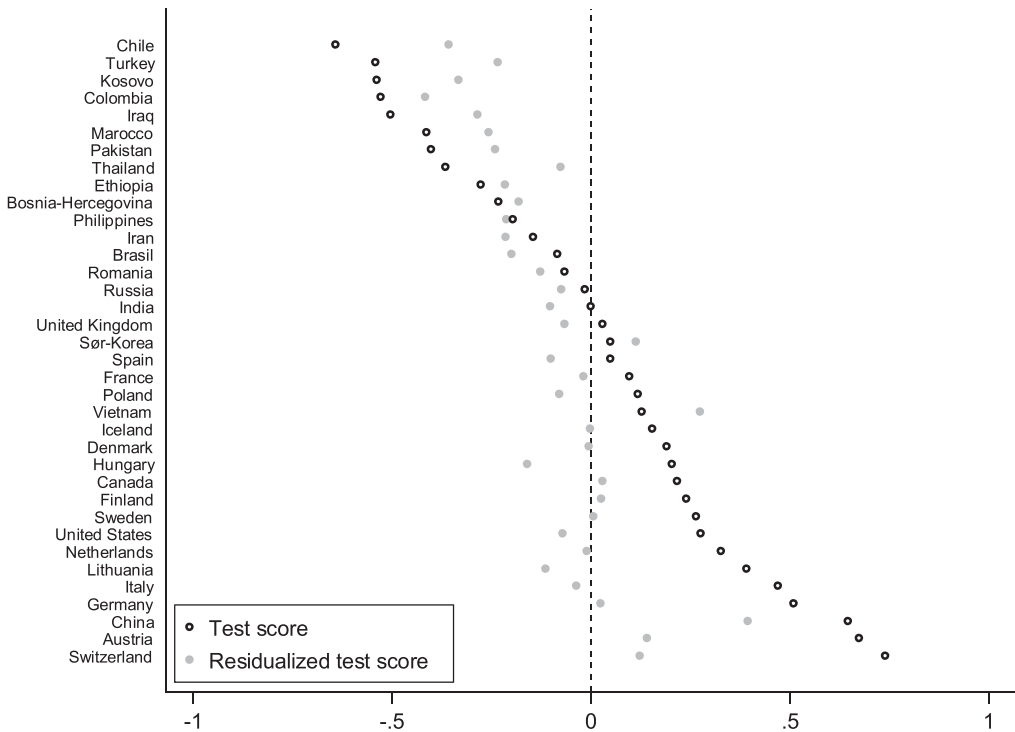


Figure 2. Educational performance and parents' country of origin. Notes: The plot displays students' mathematics test scores in the 5th and 8th grades classified by the parents' country of origin. The circles indicate the test scores measured as the difference between student with immigrant parents and (native) students with one or two Norwegian-born parents. The dashed vertical line shows the level for native students. The grey dots are the "residualized" test scores derived from a regression model where the native students are used as reference group. The residuals are generated by a model with fixed effects for years, grade levels and schools, and which controls for parental education levels, wage income, number of immigrant parents, reason for immigration (refugee, work-related, family reunion), student gender, number of siblings and parity (as in Table 2). The standard errors of the estimates (clustered on countries-of-origin) are very small and not displayed in the graph. The diagram shows country of origins with at least 1200 s-generation immigrants in our sample.

In Figure A.4 we display a plot where our residualized country-level estimates (i.e., the grey dots in Figure 1) are measured on the horizontal axis, while the vertical axis measures the test scores obtained in the TIMSS 2011 and the PISA 2012 studies.¹⁵ 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 0.50 and 0.46 (cf. Figure A.4). This indicates a high degree of external validity in the cross-national pattern observed in Figure 2.

4.4. Parenting styles and student performance

In Figure 3, we display the plots between the mathematics tests score measured at the country of origin and matching indicators of parenting styles. The plot to the left in Figure 3 shows that authoritarian parenting correlates negatively with mathematics performance. The plot in the center suggests that authoritativeness is mostly unrelated to educational performance, while the plot to the

¹⁵The 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. The bivariate correlation between the PISA- and TIMSS-indicators of mathematics performance is 0.874.

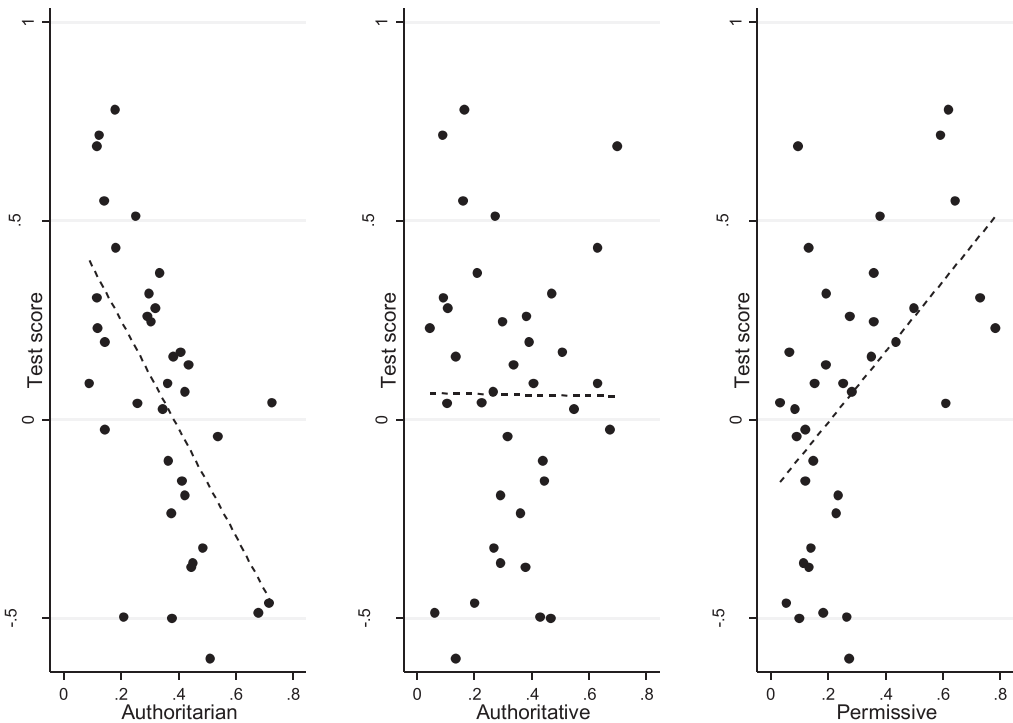


Figure 3. Educational performance and parenting styles. Note: The scatter plots shows correlations between indicators of parenting styles and educational performance. The vertical axes measure mathematics test scores in the 5th and 8th grades, averaged over country of origins for the entire dataset. The horizontal axis show scores on the indexes of Authoritativeness, Permissiveness and Authoritarian. The dashed lines indicate the regression lines.

right shows that the test results are positively related to permissiveness. We display corresponding diagrams for test scores in Norwegian and English Figures A.5 and A.6. Parenting styles correlate similarly with these outcomes, with the exception of the negative correlation with Authoritativeness. Clearly, these plots do not indicate causal relationships. Omitted variables, such as closeness to the Norwegian language and parents' human capital, correlate with the indicators of parenting styles as well as the educational outcomes.

5. Research strategy

In our baseline model specification we regress the students' educational performance on the indicators of Authoritativeness and Permissiveness and employ the Authoritarian parenting indicator as reference category. Let Y_{ikc} represent the students' test scores or exam results, i denotes student, k represents the school identification, and c is the country-of-origin. Student performance is measured by the test scores in the 5th and 8th grade and exam results in math at the 10th grade.

$$Y_{ikc} = \beta_1 \text{Authoritativeness}_c + \beta_2 \text{Permissiveness}_c + \vartheta X_{ikc} + \psi_t + \theta_k + \epsilon_{ikc}$$

Following Doepke and Zilibotti (2017), we expect a rigorous parenting regime with strict discipline to be counter-productive in a Norwegian schooling environment, and we therefore expect that the non-authoritarian parenting styles are more efficient. Parents prefer the authoritative over the permissive style in economies with high returns on human capital (cf. note 8), ostensibly because they put greater emphasis on their children's schooling performance. We therefore expect Authoritativeness to have a larger, positive effect than Permissiveness, i.e. $\beta_1 > \beta_2 > 0$. The baseline regression

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}).

5.1. 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 origin (both having the same country of ancestry). Students with two parents born in Norway are not included in this analysis (cf. Table 1).¹⁶ One reason for selecting 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. Analyzing students born in Norway means that we minimize the influence of non-parental country-of-origin effects.¹⁷ Another reason is that refugees born in the country of ancestry might have been subjected to traumatic experiences and adverse health conditions which might have affected these students' cognitive abilities negatively.

5.2. Indicators of parental human capital

Immigrant parents face similar economic, institutional, and educational conditions when they settle in Norway, which keeps many factors constant. Yet parents coming from different countries have very different levels of human capital. We employ extensive controls to account for this important confounder, the most important being mothers' and fathers' education levels (cf. Table 1). The register data allows us to control for 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 of not having (completed) 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.

5.3. School selection

As we described above, Norway has an unusually standardized school system. Nevertheless, ambitious parents may opt out of municipalities or school catchment areas in order to settle in areas where the published tests scores are higher (Black, 1999; Fiva & Kirkebøen, 2011). Including school fixed effects (θ_k) means that we estimate within-school effects of our indicators of parenting styles (cf. Figlio et al., 2019, p. 284). This also alleviates concerns related to human capital and social resources embedded in the neighborhood.¹⁸

5.4. Accounting for students initial performance

The baseline identification strategy is strong with respect to reverse causality; students' educational performance cannot influence the prevailing parenting values in their country of origin. Crucially, the epidemiological model assumes that relevant non-cultural parental characteristics can be included as observable control variables in the regression specification. Any omitted country-of-origin characteristic will bias causal estimates if it correlates with the parenting indicators and

¹⁶Students having parents born in Norway are included in Figures 1 and 2, and in Figure A1.

¹⁷Many 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.

¹⁸The 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).

schooling performance.¹⁹ Immigrant parents and their children may adapt differently to Norwegian parenting styles depending on their backgrounds, and the pace and level of integration might correlate with schooling outcomes. Similarly, the linguistic distance between immigrants' 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 therefore analyze models where we enter initial student performance as a control variable and estimate effects on the learning progression in subsequent years. To the extent that parental influences exert a persistent influence on student outcomes, we should see that those subject to the more efficient parenting styles display better developments from the lower to the higher levels of schooling. Note, also, that parents might have a stronger bearing on student learning in their early years, which implies that this model may underrate the full effect of parenting strategies.

5.5. 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 thus being closer to the preferences of Norwegian natives. This pattern appears to be consistent with Docquier et al. (2019) 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. Selection could therefore imply that immigrants to Norway display less variation in their parenting styles than the population in their home country. This might lead to a downward bias in our estimates of parenting styles on student performance.

Secondly, cultural values are not necessarily a very persistent characteristic (for review, see Fernandez, 2011, pp. 484–485). Immigrant parents might adopt Norwegian-style parenting as consequence of labor market conditions, especially at the low levels of wage dispersion and income disparity. The influence that immigrant parents have on their children might also be diluted by the values expressed by the native population. Rapid assimilation would cause immigrants' parenting style behavior to converge which would bias estimates towards zero. Finally, the parenting indicators are measured as source country averages, which necessarily lead to attenuation bias. Therefore, the research approach is likely to yield lower-bound estimates as a consequence of measurement strategy and potential assimilation and self-selection effects (Fernandez, 2011, pp. 491–496).

6. The effects of parenting styles

In Table 2, we present our baseline estimates for the effects of parenting styles on student performance. For mathematics, the estimates for the authoritative and permissive parenting styles are positive on both the (low-stakes) test scores and the (high-stakes) exam results.²⁰ The point estimates indicate that Authoritativeness is more efficient than Permissiveness; the estimates are about 25% larger for math test scores and 65% larger for exam results. Though these are substantial differences, estimate precision does not allow for definite inferences.

Similar to other studies (Figlio et al., 2019, p. 285), the estimates for the mathematics tests scores and exam results are larger than for the language outcomes. Still, the estimated effects are also

¹⁹For 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.

²⁰In a field experiment, Gneezy et al. (2017) found that US students did much better when test performances were linked to economic rewards (high stakes). Introducing economic incentives did not affect the test scores of students in Shanghai. This study suggests that performance in low-stakes tests is not a valid indicator of student ability in all countries.

positive for the reading tests and exam performance in Norwegian language. Authoritativeness and Permissiveness display estimated effects of comparable sizes, and the results are more precise for the Permissiveness indicator. For English language, the estimates are relatively low and they also display large standard errors.

Doepke and Zilibotti (2017, pp. 13646–13647) present results from an analysis of US survey data on parenting and corresponding data on grade points and the probability of attaining a Bachelor's degree or more. They present cross-sectional regressions that include controls for family characteristics and parental education levels. Although parenting styles are measured by very different survey questions than in our study, it is interesting to see that the indicators of authoritativeness and permissiveness yield the better educational outcomes. The authoritative style may be marginally more efficient than the permissive style, which is also in line with the estimates presented in Table 2.

The estimated effects are substantially important. Shifting from Authoritarian to Authoritative parenting improves mathematics performance by 0.5–0.7 standard deviations. A shift to a Permissive parenting style raises the mathematics score by about 0.4 standard deviations. These effects represent more than a full year of learning for an average student. We can also relate the estimates to parents' education levels. In Table B.5a we observe that shifting mothers' or fathers' education level from a primary school level to a higher university degree is associated with a test score increase of 0.5–0.6. The effects of parenting styles are therefore comparable to the disparities produced by parental education levels.²¹

7. The robustness of baseline estimates

The online Appendix presents a series of robustness checks related to Table 2.

7.1. 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 therefore not be included as controls (for discussion, see Fernandez, 2011, p. 495). In Tables B.5 we display estimates where the control variables are entered stepwise. We estimate models with controls for student characteristics only (I, IV); we subsequently enter controls for family situation and parents' human capital (II, V), and finally we add school fixed effects (III, VI; cf. Table 2). The estimates for Authoritativeness and Permissiveness are positive across specifications for mathematics and Norwegian. Including the individual level controls yields a lower estimate for both indicators of parenting styles. This is because human capital – particularly education levels – is positively correlated with school performance as well as the two cultural indicators. As in Table 2, the estimates for English are quite small and not significant.

7.2. 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 and other confounders, we present further analyses that account for additional country-of-origin features.

Selective immigration from the source countries may bias the estimates of parenting skills. For example, suppose immigrant parents from countries with particular parenting styles are positively selected from the source country. Unless the positive selection effect is fully captured by our control variables, selection might inflate the estimates of these specific styles. Following Feliciano (2005)

²¹Figlio et al. (2019, p. 285 and Table 2) estimate the effect of an index of "long-term orientation" on math test scores in the 3rd grade. The authors report that the indicator of long-term orientation has an effect on math test scores of 0.747, with a standardized (beta) effect of 0.116. Our standardized estimates are 0.086 (Authoritativeness) and 0.110 (Permissiveness).

and Figlio et al. (2019, p. 289), we define an index of educational selectivity defined 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. 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 his/her 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 display summary statistics for educational selectivity in Table B.2 and present the robustness test in Table B.6.

We also estimate 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 in the country of origin. The latter is due to Schoellman (2012, p. 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 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. We present summary statistics for these control variables in Table B.3 and display the regression estimates in Table B.6. Including these country-of-origin controls in baseline model has little bearing on the estimates presented in Table 2.

7.3. Long-term orientation

Parents that appreciate the longer-term benefits of human capital investments struggle to convince their children to study thoroughly (see Doepke & Zilibotti, 2017, p. 1332). Therefore, one might argue that long-term orientation is a 'deep' cultural trait that influences ways of parenting as well as students' school performance. Following Figlio et al. (2019), we therefore add Hofstede et al.'s (2010) indicator of long-term orientation as control variable in the Table 2-regressions. We also test this hypothesis using an indicator of 'patience' developed by Falk et al. (2018). The estimates presented in Table B.7 corroborate the importance of these values. The estimated effects for the parenting indicators do not deviate considerably from those presented in Table 2.

7.4. Students with one and 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 would imply 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. In Table B.8 we present separate estimates for students with one vs. two immigrant parents. In both cases, the estimated effects of Authoritativeness and Permissiveness are generally positive for test scores in mathematics and Norwegian, but not for English. As in Table 2, the mathematics estimates based on the sample with two immigrant parents indicate that an authoritative parenting style has a larger, positive effect than a permissive style.

As a further test, we estimate a model specification where we interact the parenting indicators with a dummy variable for two immigrant parents and which comprises country of origin fixed effects. We present the results in Table B.9. The interaction terms are highly correlated, causing rather large standard errors. It is reassuring to see the positive effects of the permissive style.

7.5. The mathematics gender gap

Several studies suggest that conventional attitudes to the roles of men and women in society have considerable bearing on the gender gap in math performance (Alden & Neuman, 2019; Ericson, 2019; Rodriguez-Planas & Nollenberger, 2018). We do not analyze gender-specific attitudes, but estimate the effects of parenting styles conditional on student gender. In Table B.10 we estimate three model specifications, the first being similar to our baseline specification in Table 2, the second includes country fixed effects, and the third enters sibling fixed effects. All models show that immigrant girls (on average) obtain lower scores on the mathematics test than boys. The estimated parenting-gender interaction terms are close to zero in all specifications, suggesting that these types of parenting are equally effective for girls and boys. However, our indicators parenting styles are not gender-specific. For example, we do not measure whether immigrant parents believe that boys and girls should be brought up in different ways. We leave it to future research to pursue this issue.

7.6. Controlling for initial schooling performance

We estimate a ‘value-added’ model where the response variable is defined by the performance difference over the two points of time ($Y_{ikc}^t - Y_{ikc}^{t-1}$), that is the 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 include initial test scores (Y_{ikc}^{t-1}) in the regression model, which allows us to control for many potential confounding variables that correlate with parenting styles as well as learning outcomes.

$$Y_{ikc}^t - Y_{ikc}^{t-1} = \beta_1 \text{Authoritativeness}_c + \beta_2 \text{Permissiveness}_c + \beta_3 Y_{ikc}^{t-1} + \partial X_{ikc} + \psi_t + \theta_k + \epsilon_{ikc}$$

In Table 3 we present the value-added estimates for students using a dataset with observations of both one and two immigrant parents. The overall pattern is similar to what we observed in Table 2: in mathematics, the authoritative and permissive parenting styles generate better learning outcomes relative to an authoritative style. We obtain the larger, positive estimates for Authoritativeness. Both indicators have positive effects on the learning progression in Norwegian from the 5th to the 8th grade, but not at higher levels. For English, the estimates are small and statistically insignificant.

Table 3. Parenting styles and learning progression.

	Change in math score from 5th to 8th grade I	Change in math score from 8th grade to exam in 10th grade II	Change in English score from 5th to 8th grade III	Change in English score from 8th to 10th grade IV	Change in Norwegian score from 5th to 8th grade V	Change in Norwegian score from 8th to 10th grade VI
Permissiveness	0.392*** (0.0776)	0.159* (0.0931)	0.155* (0.0855)	0.0630 (0.0690)	0.339*** (0.0746)	-0.0571 (0.0540)
Authoritativeness	0.545*** (0.192)	0.370* (0.204)	0.227 (0.200)	0.0341 (0.120)	0.285** (0.138)	0.0583 (0.0900)
Previous score 5th grade	-0.565*** (0.0181)		-0.551*** (0.0125)		-0.755*** (0.00901)	
Previous score 8th grade		-0.412*** (0.0147)		-0.301*** (0.0141)		-0.497*** (0.0131)
Observations	39,523	12,013	32,096	11,389	38,536	10,407
R-squared	0.268	0.351	0.251	0.272	0.258	0.318
Number of countries	100	95	100	94	100	97

Notes: The table displays estimates of parenting values on student progression, controlling for prior test scores. The response variables are measured as changes in test scores and exam results measured on standardized scales (zero mean, unity standard deviation). The regression models include the same fixed effects and controls as the models used in Table 2. The standard errors (in parentheses) are clustered on country of origin. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

This means students with backgrounds in countries that value authoritative or permissive upbringing have larger learning growth relative to those who are subjected to authoritative parenting.

8. Conclusions

Norwegian-born students with immigrant parents display substantial differences in educational performance. We see large disparities depending on parents' country of origin, and these differences persist after analyzing register data that allow us to control for parents' human capital and for other family characteristics.

Following Doepke and Zilibotti (2017), we use the World Value Survey and European Value Survey to measure country-specific parenting styles. The authoritarian style is defined by an appreciation of students' obedience; authoritativeness is defined by valuing hard work rather than obedience, and the permissive style values independence or imagination rather than hard work and obedience. We assume that parenting styles originating in the parents' countries of origin account for student differences in educational performance.

Our key result is that these parenting styles have important bearing on student performance, particularly in mathematics. An authoritarian parenting style yields considerably weaker test scores and exam results than the authoritative and permissive styles. This finding follows from a 'standard' epidemiological model specification, and survives a series of robustness tests. We also analyze a model with controls for students' initial performance, which goes a long way in accounting for unobserved country-of-origin confounders. Our results suggest that the authoritative and permissive parenting styles yield better learning progression than the authoritarian style. Although young people have a natural inclination for short-term enjoyment, an authoritarian parenting style is unproductive. At least in the Norwegian context, this suggests that developing cognitive skills requires a degree of intrinsic motivation not attainable by a dictatorial parenting style (cf. Bettinger et al., 2018; Flavio & Heckman, 2007; Heckman et al., 2006).

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 a consequence of the development of individual talents, greater self-confidence and job-motivation as well as improved employer-employee matching. Finally, we get the stronger results for mathematics. Jobs necessitating mathematical qualifications have dropped, 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 (Deming, 2017). Future research should also address the effects of alternative parenting styles on social skills.

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