

# Education Policy for Health Equality:

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Lessons for the Nordic Region



Nordic Welfare  
Centre

**Education Policy for Health Equality:  
Lessons for the Nordic Region**

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# Executive Summary

- Despite having the most munificent welfare states and the lowest levels of income inequality worldwide, Nordic countries do not generally achieve higher health equality than other nations. This conundrum has become known as the “Nordic health equality paradox” in the public-health debate.
- Since education is often a more important correlate of health than income, part of the explanation may be sought in the countries’ education systems. Theoretically, it is not just the number of years spent studying that should matter, but also more specifically what one learns and what skills one develop during those years.
- The educational health dividend in Nordic countries may partly reflect the countries’ knowledge-intensive labour markets, which demand knowledge and skills that lower-educated individuals do not possess. This is supported by a comparatively strong relationship between literacy and numeracy scores in the Programme for the International Assessment of Adult Competencies (PIAAC) and the probability of being in full-time employment in the Nordic region.
- Overall, research suggests a causal role for education in health production in many, but not all, contexts. Importantly, PIAAC scores are relatively strongly related to differences in self-assessed health in the Nordic countries and adjusting for such scores eradicates the relationship between parental education/immigrant status and self-assessed health in the region. In other words, there are no meaningful differences in self-assessed health between people from different backgrounds but with similar education and skills.
- Given the importance of skills reflected in test scores, it is noteworthy that Nordic education policy has come to deemphasise traditional education – in which subject knowledge and non-cognitive skills, such as grit, were key goals – in favour of more progressive, child-centred ideas focused more on school enjoyment, both as an end in itself and as a means for higher achievement.
- Yet there are differences between the countries in terms of the extent to which the progressive philosophy has translated into actual practice: overall, there is little doubt that Denmark, Iceland, Norway, and Sweden

have implemented progressive practices to quite a large extent, while Finland stands out as the country with the most traditional practices, despite official policy having increasingly come to push in a progressive direction. Still, there have been changes in a progressive direction also in Finland in the past decade or so.

- Existing research and new evidence from the Programme for International Student Assessments (PISA) suggest that while pupil-centred methods induce more positive school experiences, they decrease pupils' academic performance – which in turn is likely to have consequences for their health in a longer-term perspective. The fact that PISA scores and youth mental health have declined or stagnated, while school enjoyment has increased, in the Nordic region offers further suggestive evidence in this respect.
- Overall, the evidence base indicates that more traditional methods and hierarchical school environments are especially good for improving performance among disadvantaged pupils. Still, there is little evidence that progressive methods are good at improving pupil achievement more generally either, apart from among gifted and very high-achieving pupils.
- The evidence therefore suggests that current Nordic education policy may not be fit for purpose as a tool for promoting health outcomes and equality in such outcomes. To decrease health disparities in the future, Nordic governments should consider altering their current education-policy trajectories in a more evidence-based direction.

# 1. Introduction

Equality in health is an important tenet of the welfare states in the Nordic region (Lyttkens et al. 2016). Yet despite having the most munificent welfare states, and the lowest levels of income inequality worldwide, Nordic countries do not generally achieve lower health disparities than other European nations, although the formers' precise relative position depends on the health outcome analysed (see Christiansen et al. 2018; Mackenbach 2017; Popham et al. 2013). This conundrum has become known as the "Nordic health equality paradox" in the public-health debate.

Moreover, the trend in health equality is not uniformly positive: while absolute differences in health between different socioeconomic groups has been decreasing in the Nordic region over time, relative health inequality – the ratio of health outcomes in lower socioeconomic groups versus health outcomes in higher socioeconomic groups – is on the rise (Mackenbach et al. 2016; Mackenbach, Valverde et al. 2018). In other words, while many health outcomes are improving for all socioeconomic groups, more advantaged groups appear to enjoy larger relative improvements.

There are several possible reasons behind the persistent health inequities and rising relative disparities in the Nordic countries, including purely mechanical effects due to changes in the socio-economic distributions over time (Hartman and Sjögren 2017; Mackenbach 2017). Yet it is plausible that at least part of the explanation should be sought in the countries' education systems; individuals' educational level often appears to be a more important explanation for health differences than income (Grossman 2006). The educational dividend in Nordic region may partly reflect the countries' knowledge-intensive labour markets, which demand knowledge and skills that lower-educated individuals often do not possess. Indeed, while the wage premium of knowledge and skills is relatively low among people with a full-time job in the Nordic region, it is large in comparisons that include non-employed people and individuals in part-time employment (see Hanushek et al. 2015). In other words, there is a relatively low payoff to knowledge and skills in the Nordic countries once one reaches the minimum threshold to enter full-time employment, but this threshold appears to be higher than in many other countries. As labour-market participation is strongly linked to health (e.g. Bambra and Eikemo 2009; Nordström et al. 2014; Vaalavuo 2016; Waddell and Burton 2006), it is therefore unsurprising that educational differences are closely connected to health inequities in the Nordic region.

Yet all education is not equal. Given the importance of knowledge and skills, as captured by test scores, for labour-market opportunities in the Nordic countries, it is important to investigate whether their education systems are fit for purpose in this respect specifically – and the extent to which they are likely to contribute to, or counter, health inequities in the population at large.

In this report, we analyse how education policy is likely to affect health equality in the Nordic countries. To do so, we proceed as follows. First, we discuss the theoretical mechanisms that may link education to health, while showing that knowledge and skills – measured by literacy and numeracy scores in the Programme for the International Assessment of Adult Competencies (PIAAC) – are relatively unequally distributed in the Nordic countries. We also show that the relationship between PIAAC scores and employment is stronger in the Nordic region than elsewhere.

Second, we review the empirical research on the effect of education on health outcomes worldwide to establish a causal link at a general level. Overall, our review of existing research suggests that education in many, but not all, contexts has a positive causal impact on health outcomes, either directly or in an intergenerational perspective. Still, the causal literature focuses overwhelmingly on education levels rather than on performance in knowledge-based tests, which is a more direct indicator of skills. Existing research indicates a positive relationship between cognitive and non-cognitive performance and adult health overall, suggesting an important role for education to the extent that it increases knowledge and skills in the population.

Third, we analyse the relationship between PIAAC performance and self-assessed health to investigate the health gradient of knowledge and skills in the Nordic countries in a relative perspective, as well as the importance of knowledge and skills for health disparities between different social groups in the Nordic region specifically. We find that PIAAC scores are relatively strongly related to self-assessed health in the Nordic countries. We also show that adjusting for such scores eradicates the relationship between parental education/immigrant status and self-assessed health in the region. In other words, cognitive performance does appear important for understanding health outcomes and social inequities in the Nordic countries.

Fourth, we review the literature analysing what types of schooling that are most likely to contribute to higher health equality via better educational outcomes – and the extent to which the Nordic education systems are fit for purpose in this respect. We also provide new evidence from the Programme for International

Student Assessments (PISA) to highlight how its dominant education paradigm is likely to affect health equality via school performance.

Given the importance of skills captured by test scores, it is noteworthy that Nordic education policy in the past decades has come to deemphasise traditional education – in which subject knowledge and non-cognitive skills, such as conscientiousness and grit, were upheld as key goals – in favour of more progressive, child-centred ideas focused more on school enjoyment, both as an end in itself and as a means for higher achievement. The intellectual basis for these practices can be traced to the publication of Jean-Jacques Rousseau's (1889) *Émile, or On Education* in 1763. In the interpretation that has come to dominate educational thinking, teaching of facts and core knowledge is assumed to hinder pupils from acquiring a deeper understanding of the subjects, decreasing their joy for learning and therefore contributing both to an unhappy childhood and lower achievement. The solution has been to promote pupils' own search for knowledge and decrease the role of traditional authorities in the learning process.

In all Nordic countries, education policy has to varying degrees come to embrace this philosophy, in some cases also bolstered by postmodern theories of knowledge. Yet the report shows that there are differences between the countries in terms of the extent to which this philosophy has translated into pedagogical practice: overall, there is little doubt that Denmark, Iceland, Norway, and Sweden have implemented progressive practices to quite a large extent, while Finland stands out as the most traditional country of the five, despite official policy having increasingly come to push in a progressive direction. Nevertheless, also Finland appears to have moved towards more pupil-centred practice in the past decade or so.

Importantly, research suggests that more traditional and hierarchical types of schooling – with a strong focus on cognitive performance and non-cognitive skills, such as conscientiousness and grit – are better than progressive, child-centred ways of working for improving achievement, especially among children from less advantaged background. While very high-performing pupils in some cases benefit from progressive methods, this is not the case among other pupils. At the same time, these methods appear to be positive for school wellbeing, suggesting there is a trade-off between positive emotions and school performance. Using individual-level PISA data across the Nordic countries, and cross-country data at the OECD level, we provide further evidence in support of these conclusions.



Overall, the evidence suggests that Nordic education policy may not necessarily be fit for purpose from a public-health perspective. While the progressive philosophy induces more positive school experiences in the short run, it also appears to decrease pupils' performance – which in turn is likely to have consequences for their health in a longer-term perspective. The fact that both PISA scores and youth mental health have declined or stagnated, while school enjoyment has increased, in the Nordic countries offers further suggestive evidence in favour of this argument.

To lower health disparities in the future, we therefore suggest that the Nordic governments to some extent alter their current education-policy trajectories in a more evidence-based direction. While changes in practice do not follow automatically from changes in policy, such a move would be an important first step towards the creation of education systems that advance more equal health outcomes in a long-run perspective.

## 2. Theory and background

According to economic theory, individuals invest in education and training in order to increase their human-capital levels and in this way raise their earnings and productivity (Becker 1964). Empirical research suggests that education improves labour-market outcomes, an effect that to a substantial extent appears to operate via improved human capital (e.g. Brunello et al. 2016; Bhuller et al. 2017). Similarly, at the macro level, research finds that average knowledge levels across countries' populations are strongly related to economic growth (Hanushek and Woessmann 2015).

However, education is also likely to yield non-pecuniary benefits of relevance for both the individuals it benefits and society at large. Indeed, since education does not only create private value, there are compelling reasons for the government to finance and stimulate investments in knowledge and skill development for all (see McMahon 2010). Such potential non-pecuniary benefits include improved health behaviours and outcomes.

There are several potential mechanisms through which education may improve health. In the economic model developed by Grossman (1972), education raises the marginal productivity of inputs in health production. Just as it is assumed that education raises people's productivity in the labour market, it is also likely to increase their productivity in other activities, including producing their own and their children's health. In this sense, we would assume that education improves health even if it does not alter the inputs invested in it overall.

Yet we may also assume that education does change inputs in the health-production process, as it could improve individuals' ability to process health-related information and make decisions concerning their health. In this sense, educated individuals are likely to be better informed about the health effects of certain behaviours (Kenkel 1991; Lochner 2011). Education may therefore change health behaviours in a positive direction, such as by reducing alcohol consumption and smoking while also improving nutrition more generally (see Rosenzweig and Schulz 1981; Cutler and Lleras-Muney 2010).

In addition, education increases people's life-time earnings, which in turn raises the marginal value of health and induces individuals to invest more in it, for example by leading healthier lifestyles. It may also shift the social environments in which individuals interact, improve individuals' sense of control and other non-cognitive skills or personality traits, time preferences – since schooling may sharpen pupil attention on the future – as well as decrease stress (see Becker

and Mulligan 1997; Fuchs 1982; Chiteji 2010). The result of these mechanisms would therefore be improved health behaviour and outcomes.

Of course, it is also possible that the education effect on health is a zero-sum game. In this story, education improves health via increases in social prestige, directly and indirectly, as it increases one's rank in society relative to others (Rose and Marmot 1981). As one individual moves up in rank, another one moves down, thereby affecting the distribution of health but not necessarily average health in the population (Ljungdahl and Bremberg 2015).

Regardless, following the above discussion, we should expect more equal distributions of education to generate more equal distributions of health outcomes in the population. In this sense, interventions that disproportionately increase education among lower socio-economic groups are likely to generate higher health equality in a longer-term perspective.

It is therefore somewhat of a conundrum that health inequalities persist so clearly in modern welfare states, in spite of considerable redistribution and expanding education systems, as is "the lack of association between the extent or intensity of welfare policies in a country on the one hand, and the magnitude of its health inequalities on the other hand" (Mackenach 2017, p. 14). Indeed, there is little to suggest that socioeconomic health inequalities are smaller in the generous Nordic welfare states than in more liberal, less generous ones. This holds true both in terms of absolute health inequalities as well as relative ones (e.g. Mackenach 2017; Muntaner et al. 2011). Moreover, relative health inequalities are in fact widening in the Nordic countries (Mackenbach et al. 2016; Mackenbach, Valverde et al. 2018).<sup>1</sup> This is despite the fact that modern welfare states – and especially the Nordic ones – have successfully expanded the education system to include more people from lower socioeconomic groups.

Of course, it is important to distinguish between the effects on health of time spent in school and the effects of what one learns in school (see Cunha and Heckman 2007). For example, as Gottfredson (2004, p. 189) argues: "Health self-management is inherently complex and thus puts a premium on the ability to learn, reason, and solve problems." Indeed, many of the mechanisms proposed for why education may affect health suggest it is not just the number of years spent in the education system that should matter, but also more specifically what one learns and what skills one develop during those years. That is,

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<sup>1</sup> Furthermore, the fall in absolute inequality does not appear to be uniform across time periods and measures analysed. For example, recent research suggests there was no decline in absolute self-assessed health inequality in the Nordic countries between 2005 and 2014 (Leão et al. 2018).

education is an input into the production of cognitive and non-cognitive skills, which are assumed to be positive for health, but it is not a direct measure of such skills. Direct measures of people’s cognitive and non-cognitive skills are therefore likely to be important to fully capture the education effect on health. In this sense, merely inducing more people to attain higher levels of education is unlikely to be a sufficient strategy from a health perspective; education quality is also likely to matter to the production and protection of health.

To understand whether or not it is reasonable to believe that inequality in knowledge and skills is an explanatory factor for the Nordic health-equality conundrum, it is useful to investigate the extent to which the Nordic welfare state equalises such outcomes in the population in a relative perspective. We do so by comparing the standard deviation in the average numeracy and literacy scores in the international survey PIAAC in Denmark, Finland, Norway, and Sweden with the standard deviation in other countries whose population sat the test in the 2012 round, using micro-level data obtained from the OECD (2018a).<sup>2</sup> PIAAC surveys the adult population’s literacy and numeracy skills, as well as problem solving skills in technology-rich environments. It also collects rich information on respondents’ backgrounds and how they utilise their skills. In the first round, which was carried out in 2012, there were 166,000 participants aged 16–65 from 24 countries.<sup>3</sup>

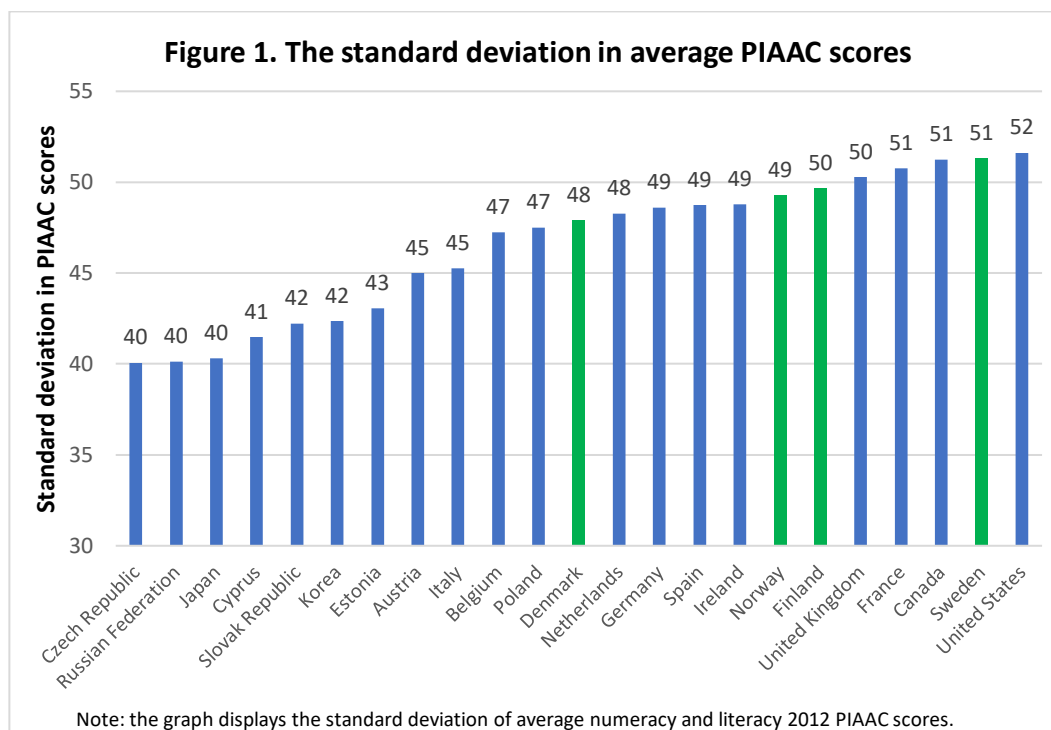
And as Figure 1 shows, there is no evidence that knowledge and skills stand out as particularly equally distributed in the participating Nordic countries in a relative perspective. In fact, Sweden has the second highest standard deviation after the United States in the comparison. Denmark has the most equal distribution of the participating Nordic countries, but is still a middling country in this respect. In other words, despite having the most munificent welfare states, knowledge and skills are not particularly equally distributed in the Nordic

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<sup>2</sup> Unfortunately, we cannot include Iceland in the analysis since it has not yet participated in PIAAC. The comparison excludes Australia since its data are not included in the OECD’s (2018a) public-use file, which we use to calculate the standard deviation in average scores at the individual level with the correct methodology. PIAAC numeracy and literacy scores are created from 10 plausible values each, which must be taken into account to account for uncertainty in the estimates. We therefore average each pair of the plausible values and use these to calculate the average standard deviation at the country level.

<sup>3</sup> For more information about the PIAAC data and the sample obtained for the different countries, see OECD (2013a). It is important to note that PIAAC and similar test scores are likely to pick up both cognitive and non-cognitive skills, such as conscientiousness (e.g. Balart et al. 2018; Borghans et al. 2016), and our analysis therefore gives us a good overall picture of inequality from a cognitive as well as non-cognitive perspective.

populations overall. It is therefore certainly a reasonable hypothesis that the distribution of skills at least partly explains the Nordic health-equality paradox.



This is further supported by an analysis of the relationship between PIAAC scores and employment outcomes. While previous research suggests that the wage returns to PIAAC scores are low in the Nordic countries, this only holds true when analysing people in full-time employment. When including all people in the analysis, including those who are outside the labour market, the returns are instead some of the highest among all countries analysed (Hanushek et al. 2015). This suggests there is a relatively low payoff to knowledge and skills in the Nordic region once reaching the threshold to enter full-time employment, but this threshold appears to be higher in a relative perspective.

To analyse this further, we studied the relationship between average PIAAC literacy and numeracy scores and employment at the individual level, using data from the OECD (2018a), when holding constant age, gender, immigrant status, and parental education levels.<sup>4</sup> As we are mostly interested in the knowledge

<sup>4</sup> The models weight respondents by the sample weights provided by the OECD (2018a) to ensure that the sample analysed is representative of the population in each country, while also accounting for uncertainty in the sample structure using replicate weights and the jackknife replicate procedure. As noted in footnote 2, PIAAC numeracy and literacy scores are created from

dividend for strong labour-force attachment, we compare full-time employees working at least 30 hours per week with people outside the labour force and people in part-time employment. To take into account different levels and distributions of PIAAC scores in the different countries, we standardise the scores to have a mean of zero and a standard deviation of one in each country. This is important since it is unlikely that one PIAAC point has the same effects on the probability of labour-market success across different countries. This is likely to depend on the performance level of other people in the same country with whom one is competing.<sup>5</sup> By standardising the PIAAC scores, we analyse the association between the same relative increases in performance on the probability of employment within the different countries. In other words, we analyse the relationship between an increase in PIAAC scores by one standard deviation within each country and the probability of being in full-time employment.

The results are displayed in Figure 2, which shows that the relationship between PIAAC scores and full-time employment is strong in the Nordic countries in a relative perspective.<sup>6</sup> Indeed, Denmark, Finland, Norway, and Sweden come out on top of all countries included in the analysis in this respect. As labour-market participation is linked to health (e.g. Bambra and Eikemo 2009; Nordström et al. 2014; Vaalavuo 2016; Waddell and Burton 2006), these results support the hypothesis that differences in the importance of knowledge and skills across countries may help explain the Nordic health-equality paradox.<sup>7</sup>

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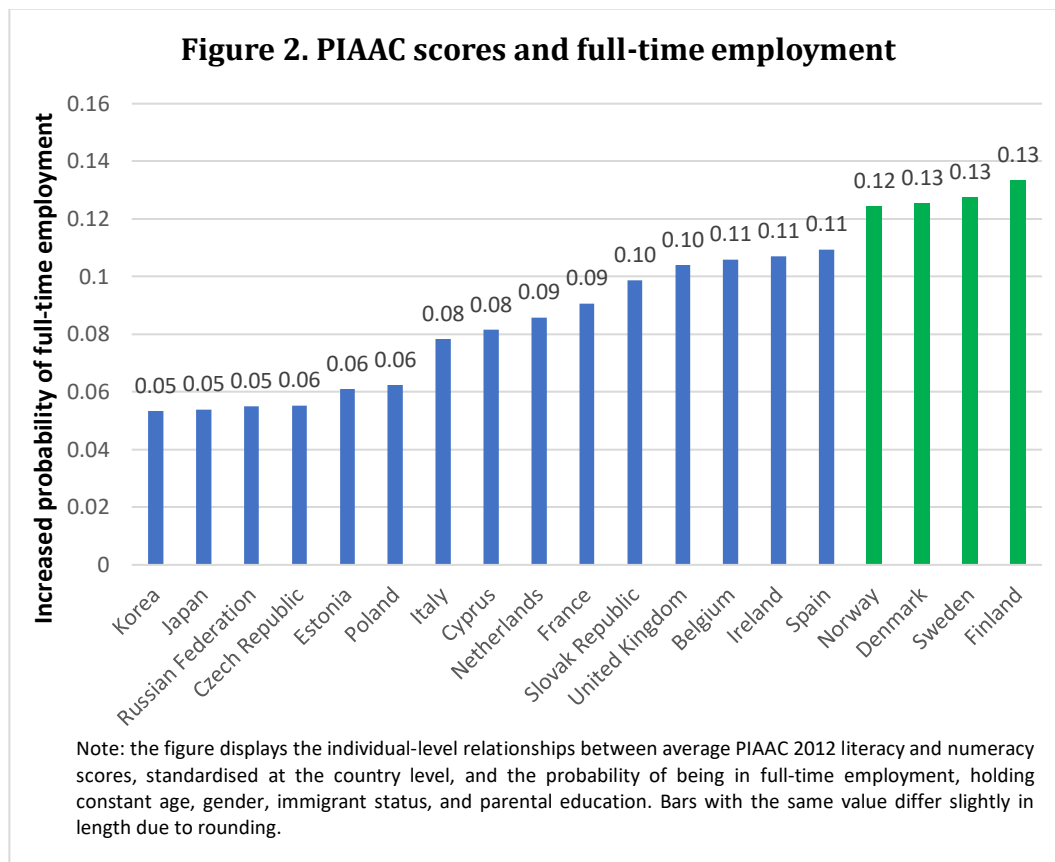
10 plausible values each, which must be taken into account to account for uncertainty in the estimates. We therefore average each pair of the plausible values and use these to calculate the average score correctly in the models. To deal with missing values on the control variables, we replace such values with the country mean of the variable in question and include dummies for missing values. In all our analyses, we use regular OLS models. Since we analyse a binary dependent variable, employing non-linear models could be an alternative strategy. However, there is in fact little to gain from such models – in fact, the reverse is often the case (see Angrist and Pischke 2008). For this reason, research in the economics of education and health economics most often utilise linear models also when studying binary or ordinal variables (e.g. Mazzonna and Peracchi 2017; Burgess and Heller-Sahlgren 2018).

<sup>5</sup> It may for this reason also be reasonable to standardise the outcome variable: the probability of being employed differs across countries due to different labour-market structures, among other things. As noted in footnote 7, the results are very similar if we do so. However, since standardising a binary variable makes it difficult to interpret the results – as one can only be employed or not employed regardless of country – we refrain from standardising the employment indicator in the main analysis.

<sup>6</sup> Of the countries included in the comparison in Figure 1, Austria, Canada, Germany, and the United States are excluded in this analysis because there are no available data on respondents' age in these countries.

<sup>7</sup> In unreported analyses, we standardised the employment indicator to have a mean of zero and a standard deviation of one in each country to take into account different distributions of the probability of being in full-time employment across countries. While this makes the absolute

Overall, while we of course cannot conclude that the relationship displayed is causal, it therefore appears important to explore the importance of knowledge and skills for health inequalities in the Nordic countries. To do so, the next section discusses the empirical evidence for the effects of education on health and provides a new empirical analysis of the importance of knowledge and skills for health inequalities in the Nordic countries specifically.



interpretation of the results difficult – as we are studying a binary outcome – the rank order of countries was similar and the four participating Nordic countries again came out on top. In other unreported analyses, we extended the sample to also include self-employed individuals and the results were again very similar.

### 3. Education and health: existing evidence and new findings

Having discussed the theoretical mechanisms supposed to link education to health, and provided evidence suggesting it is reasonable to believe that inequality in knowledge and skills is an explanatory factor for the Nordic health-equality conundrum, we turn to the empirical literature to establish whether or not the evidence base supports the theoretical predictions. Overall, there is little doubt that education – measured in levels and years of schooling – has a strong relationship with health in essentially all settings analysed, suggesting considerable inequalities in most health outcomes depending on educational background (e.g. Kunst and Mackenbach 1997; Mustard et al. 1997; Ross and Mirowsky 1999). This is also true in the Nordic countries (Mackenbach et al. 2016; Mackenbach, Valverde et al. 2018). If we were to assume that the relationship between education levels and health is causal, this would suggest a crucial role for education policy in decreasing inequities in health, for example by committing more resources to increase educational levels among children from lower socioeconomic backgrounds.

Yet proving that causality runs from education to health is far from easy. The key problem is that individuals' health may affect their investments in their education rather than the other way around, and that other variables may affect both education and health levels. For example, it is plausible that individuals who are in poor health in their younger years are unable to obtain as much education as individuals who are in good health. This would in turn lead to a "selection problem", which makes it look as if education improves health, even though it does not necessarily have any causal effects whatsoever. Selection bias may be due to observable characteristics, such as family background, or unobservable characteristics, such as genetic differences.

To be confident of the causal effects of education, it is therefore necessary to solve this selection problem. One way to do so is through randomised-controlled experiments. In such experiments, some participants are randomly allocated to a treatment group, who are subjected to a specific intervention that increases their educational level, while other participants are randomly allocated to a control group, who are not subject to this intervention. Randomisation ensures that neither observable nor unobservable characteristics affect the likelihood of treatment, ensuring that any selection bias is effectively evened out across the different groups (e.g. Heckman and Smith 1995). Certainly, randomised



experiments have flaws (Deaton and Cartwright 2017), but they are crucial tools when seeking to understand the causal effects in social-scientific research.

## Randomised experiments

Of course, it is difficult to implement bona-fide controlled experiments in which some individuals are allowed to go through more schooling than others, not least for ethical reasons. To the best of our knowledge, there is only indirect evidence on educational effects on health from two specific trials. The Perry Preschool Programme and Abecedarian Programme provided early childhood education – through cognitive stimulation, nutritional support, and health services – to randomly selected American children from disadvantaged backgrounds in the 1970s. Research has found that these programmes improved physical health, especially among men, effects that can be explained by improved grades, non-cognitive skills, and labour-market performances later in life (Campbell et al. 2014; Conti et al. 2016; Heckman et al. 2013). Certainly, both programmes were small, with only a couple of hundred participants, and focused on very underprivileged children with low intelligence, most of whom were sampled from ethnic minorities, making it difficult to draw conclusions regarding the relevance of these findings to other contexts. Still, the experiments do indicate that education in childhood can help very disadvantaged children catch up in terms of health outcomes later in life.

## Quasi-experimental research

While the number of randomised controlled trials analysing the impact of education on health is limited, a plethora of new quasi-experimental methods have emerged in the past decades to obtain causal estimates also in analyses of observational data. These methods differ in many respects, but they all have in common that they seek to obtain random variation in programme participation based on various forms of “natural experiments” (see Angrist and Pischke 2008). Such methods allow researchers to study the causal effect of education on health despite the lack of controlled experiments in the field.

And, interestingly, this type of research displays a slightly ambiguous picture in terms of the effects of educational investments in health production. In the past decades, studies have investigated the health impact of extending compulsory-education laws, or other reforms that induce individuals to obtain more schooling, in countries worldwide. Such reforms are useful for understanding the effects of education on health equality, since they tend to increase the number of years of schooling among specifically the least educated individuals in society. If individuals affected by these laws receive a long-term health

dividend as a result of undergoing more education, they should also improve their health relative to individuals with higher levels of education who are not affected by the laws.

Some studies exploiting compulsory-education laws to study health effects of education do display a positive impact of education on various health measures – including mortality rates, life expectancy, and self-reported health – in a number of countries, especially among men (see Brunello et al. 2015; Crespo et al. 2014; Davies et al. 2018; Fletcher 2015; Galama et al. 2018; Gathmann et al. 2015; Janke et al. 2018; Ljungdahl and Bremberg 2015; Kemptner et al. 2011; Mazzonna 2014; Powdthavee 2010; Powdthavee och Li 2015; Silles 2009; van Kippersluis et al. 2011).<sup>8</sup> Other research also indicates that higher parental education due to compulsory-education reforms improves health among children, suggesting that some of the gains operate through intergenerational mechanisms (e.g. Chou et al. 2010; Günes 2015). Still, other studies – or in some cases the same ones analysing other reforms and/or outcomes – using the compulsory-school reform methodology find no effects of education on health in other contexts (see Albouy and Lequien 2009; Clark and Royer 2013; Galama et al. 2018; Gathmann et al. 2015; Janke et al. 2018; Jürges et al. 2013; Lindeboom et al. 2009; Ljungdahl and Bremberg 2015; Malamud et al. 2018; Oreopoulos 2006; Powdthavee 2010).<sup>9</sup> This suggests the impact of expanding education is context and period dependent (see Cutler et al. 2014; Galama et al. 2015), highlighting the importance of investigating the effects in the countries under study and preferably at different points in time.

Focusing on the evidence from the Nordic countries specifically, the evidence further supports the idea that context matters greatly for the impact of education on health. In Denmark, Arendt (2005) finds only statistically insignificant effects on self-reported health of the school reforms in 1958 and 1975, but it appears this is primarily due to a small sample that makes the reform a weak predictor of increases in years of schooling in the affected cohorts. A similar problem applies to Gathmann et al.'s (2015) study, which finds no evidence of an impact of the reform carried out in the 1970s. However, using a

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<sup>8</sup> The seminal work using this approach was the study by Lleras-Muney (2005), who found large effects of compulsory-education reforms in American states. Yet some research has found that these reforms had too small an impact on the education distribution for the purposes of estimating reliable effects of education on health (Black et al. 2015). Still, Fletcher (2015) finds that the laws did have positive effects on health among low-educated people specifically.

<sup>9</sup> Janke et al. (2018) also analyse a more recent reform affecting primarily the share of people attending further and higher education in the UK, finding no effects on chronic health conditions apart from a reduction in diabetes. Oreopoulos's (2006) study is usually cited as indicating a positive causal impact of schooling on health in the UK, but this was due to a coding error. Once corrected, the impact on health disappeared (Oreopoulos 2008).

much larger sample and studying the reform in 1958, Arendt (2008) does find that education decreases the probability of being hospitalised.

Meanwhile, in Sweden, two studies analysing the effect of the comprehensive-school reform carried out between 1949 and 1962 find little evidence that education affects mortality overall (Lager and Torssander 2012; Meghir et al. 2018), although one of these studies finds decreasing mortality after the age of 40, an impact concentrated in the least educated groups (Lager and Torssander 2012). Another study finds that the same reform had positive effects on an overall health index (Spasojevic 2010), while Meghir et al. (2018) find no impact on hospitalisations. The latter study is the most convincing in terms of methodology and data analysed, suggesting that the Swedish comprehensive-school reform had little impact on mortality and hospitalisations overall. Still, other research finds that the reform did have positive effects on health among young men via its impact on maternal (but not paternal) education (Lundborg et al. 2014), suggesting it did improve health in an intergenerational perspective.

While no studies to the best of our knowledge analyse the effects of changes to compulsory-schooling laws on mortality in Finland, Iceland, or Norway, research on the Norwegian comprehensive education reform in the 1960s indicates it had little impact on cancer risk, apart from decreasing the risk of lung and prostate cancers among men (Leuven et al. 2016). However, the comprehensive-school reform in Norway as well as two separate school reforms in Iceland appear to have generated better health among infants as a result of parents undergoing more education (Birgisdóttir 2013; Grytten et al. 2014). This again suggests that education often has positive effects in an intergenerational perspective, which should be taken into account when considering the effects on health inequities in the longer-term perspective.

Yet a key problem when interpreting the above evidence stems from the fact the changes in compulsory-schooling laws analysed were carried out at the same time as other key changes to the education system. Indeed, the Nordic reforms analysed in the above studies also decreased or abolished the level of tracking by ability – with accompanying changes in curricula – and similar changes have in other contexts been found to have negative effects on long-term health by themselves (Basu et al. 2018). In other words, it appears impossible to disentangle the effects of increased education from the other changes in the education system carried out at the same time as the compulsory-schooling age was increased following the Nordic reforms.

To the best of our knowledge, there is only one study in the Nordic context that analyses a compulsory-schooling reform without accompanying changes to the

wider education system. Fischer et al. (2013) find that a reform in Sweden that increased compulsory education from 6 to 7 years between 1936 and 1949 led to strong and persistent declines in mortality, an impact that is detectable early on and then grows with age. The effect is also similar among men and women. While it is questionable whether these results are useful for understanding the potential effects of extending compulsory-education laws to even higher ages in today's context, it does suggest that education expansions do have the potential to carry health benefits in certain situations, in support of some research outside the Nordic context.

## Twin studies

As noted, a key problem with estimating the causal impact of more education on health using the compulsory-school methodology in the Nordic context is that most of the reforms analysed changed other important features of the education system as well. This may also help us understand the heterogeneous findings in the literature more generally, since the different reforms that have been analysed are rather unique and are therefore likely to have affected the broader education systems in different ways.

A different way to estimate the causal impact of education on health, which does not suffer from this problem, is through the twin methodology. Twins share a lot of environmental factors we presume are important for both education and health, such as family life, food, neighbours, age, and the number of siblings. Analysing monozygotic twins also enables researchers to adjust for all heritable factors that affect both education and health. The assumption is that any remaining differences in educational levels between twins are due to random factors, which are unrelated to health. Furthermore, while studies analysing the effects of education reforms are only able to retrieve the impact of education on health among people affected by the reforms, twin estimates are likely to better reflect the average impact in the population under study. Certainly, the twin methodology also suffers from important weaknesses and it is not clear whether or not the estimates it produces are in fact policy relevant (see Boardman and Fletcher 2015; Manski 2011). Nevertheless, it is one of few ways used in the literature to at least get closer to causal inference.

Overall, there are only a few studies using the twin methodology to analyse the impact of education on health and they only cover a couple of countries. In the US, the evidence is mixed, but there is evidence of positive effects on longevity and self-reported health (Fujiwara and Kawachi 2009; Halpern-Manners et al. 2016; Kohler et al. 2011; Savelyev et al. 2018). In China, too, research suggests that education increases self-reported health and decreases the number of

chronic diseases (Behrman et al. 2015), while there is some weak evidence that schooling has a positive impact on physical health in the UK (Amin et al. 2013).

Yet most studies using the twin methodology emanate from the Nordic region, which is useful for our purposes. In Denmark, research has found little evidence of causal positive effects of schooling on general health, cardiovascular disease, or ischemic heart disease, and mixed evidence in terms of mortality (Behrman 2011; Madsen et al. 2010, Madsen et al. 2014; van den Berg et al. 2015). In Finland, one twin study finds that education decreases medication use and also improves some health behaviour, but that it does not affect the number of diseases (Böckerman and Maczulskij 2016). In Sweden, one recent paper finds no impact on self-reported health on average, but it does find that education has a positive effect among all groups apart from at the very top of the health distribution. Moreover, the effect is the strongest at the bottom of the health distribution, suggesting education may be especially important in this group (Gerdtham et al. 2016). And in the largest twin study to date – comprising about 50,000 twins – researchers have shown that education does decrease mortality also on average among both men and women in Sweden (Lundborg et al. 2016). We therefore conclude that the twin methodology yields mixed effects across Nordic countries, although the largest one indicates positive effects on longevity in Sweden.

## **Conclusion from research on how education duration affects health**

Overall, while we conclude that the rigorous evidence on whether education is causally related to health is mixed, several studies do indicate a positive impact. When considering research from both comprehensive-school reforms and twin studies, as well as accounting for mechanisms that operate in an intergenerational perspective, this also holds true in the Nordic region overall. It is therefore reasonable to assume that education does have potential to affect health, but that the exact benefits depend on the context and the type of education undertaken.

## **Studies analysing direct measures of cognitive and non-cognitive skills**

Of course, all studies analysed so far focus on the health effects of educational levels or years of schooling per se. Yet, as highlighted in Section 2, attending school should be seen as a measure of investment in knowledge and skills, not as a direct measure of knowledge and skills. Indeed, many of the mechanisms

supposed to link education to health are thought to operate via improved cognitive and non-cognitive skills rather than via the number of years of schooling attained. That is, it is not just attendance that is likely to matter but also what one learns while being in education.<sup>10</sup> It is therefore important to also consider the health effects of more direct measures of knowledge and skills.

While research on the importance of cognitive and non-cognitive skills for health is in its infancy, and does not allow us to draw causal conclusions, whatever evidence does exist indicates a positive relationship. For example, American research shows that both cognitive and non-cognitive skills, such as conscientiousness and self-control, are significant predictors of adult health (Conti and Heckman 2010; Auld and Sidhu 2005; Duke and Macmillan 2016; Kaestner and Callison 2011; Moffitt et al. 2011). Similarly, research indicates that the association between education length and mortality in the Netherlands is reduced when adjusting for cognitive skills, suggesting that such skills are important for explaining how education may impact health (see Bijwaard and Jones 2016; Bijwaard and Van Kipperluis 2016; Bijwaard et al. 2015). Meta-analyses also reveal that cognitive skills are important for health (e.g. Calvin et al. 2011). While we cannot draw causal conclusions from this research, it does indicate an important role for cognitive and non-cognitive skills in health production, which is further supported by the fact that schooling has been shown to increase such skills (e.g. Carlsson et al. 2015).

While the above research focuses on cognitive and non-cognitive skills in adolescence, there is also research analysing the direct link between test performance and health among adults. Indeed, a couple of studies have analysed the relationship between literacy scores in PIAAC and self-assessed health in up to 33 countries, finding a positive impact of literacy performance on health in most countries even after adjusting for years of schooling and individual-level controls. Interestingly, though, the association between literacy skills and health is not always statistically significant in the Nordic countries (Borgonovi and Pokropek 2016; Kakarmath et al. 2017; Lee 2017). If we were to assume these relationships to be causal, it would mean there is no causal impact of test performance and self-assessed health in the Nordic region.

However, these papers adjust for a wide range of controls that may be the result of higher literacy skills rather than a cause of such scores, including labour-market and occupational status, books at home, and educational levels. They

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<sup>10</sup> One important criticism against twin studies is that they ignore differences in cognitive skills when seeking to analyse the effects of years of schooling on various outcomes (see Sandewall et al. 2014).

also ignore numeracy scores entirely, which may also have an impact on health. In addition, they do not take into account differences in the levels and distributions in health and literacy skills across countries, which is important for understanding health inequalities in a comparative perspective. This makes it difficult to draw conclusions from these studies for our purposes – and makes it important to investigate the relationship between PIAAC scores and self-assessed health further.

## New evidence from PIAAC

We therefore use micro-level PIAAC data from the OECD (2018a) to analyse the relationship between test-score inequality and inequality in self-assessed health.<sup>11</sup> Since these tests pick up both cognitive and non-cognitive skills, such as conscientiousness and grit (e.g. Balart et al. 2018; Borghans et al. 2016), our estimates reflect how health is related to both cognitive and non-cognitive skills combined. If our hypothesis that direct measures of such skills help explain the Nordic health-equality paradox, we would assume a relatively strong relationship between relative PIAAC scores and relative self-assessed health in the Nordic countries.

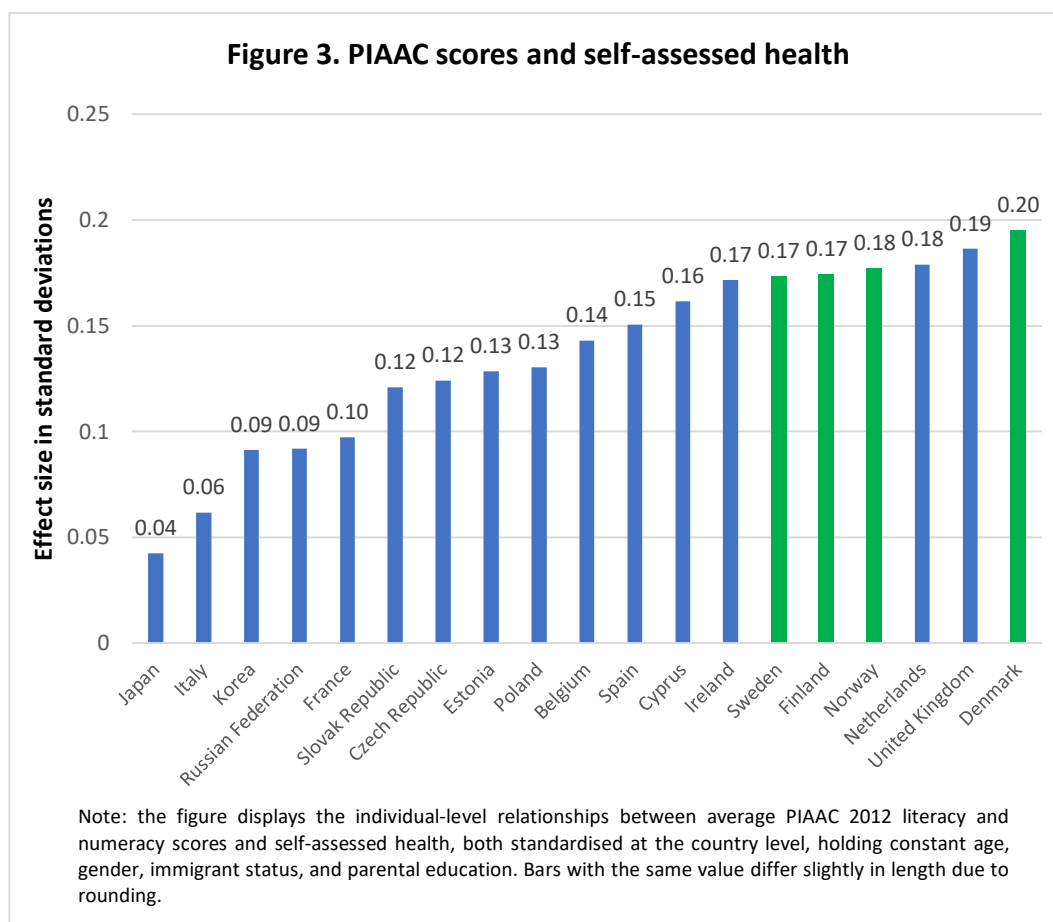
In PIAAC, respondents were asked the following question: “In general, would you say your health is excellent, very good, good, fair, or poor?” The scale ranges from 1 (“excellent”) to 5 (“poor”), which we recode so that higher values instead indicate better health. To take into account different levels and distributions of PIAAC scores and health – as we focus on the impact of relative score performance on relative differences in health – we standardise the PIAAC scores and the health scale to have a mean of zero and a standard deviation of one in each country. This is important since it is unlikely that one PIAAC point has the same impact on self-assessed health across different countries. Instead, the effect is likely to depend on the performance level of other people in the same country with whom one is competing. Similarly, one step on the self-assessed health scale may mean different things in different countries, as average health levels and distributions differ, and people may also interpret the questions differently in different contexts. By standardising both PIAAC scores and the self-assessed health scale, we analyse the impact of the same relative increase in performance on the same relative change in self-assessed health in the different countries. As in the analysis of employment outcomes in Section 2, we adjust for age, gender, immigrant status, and parental education levels.<sup>12</sup>

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<sup>11</sup> For more information about the PIAAC data and the sample for the different countries, see OECD (2013a).

<sup>12</sup> The analysis employs the methodology described in footnote 4.

The results are reported in Figure 3 and show that the relationship between PIAAC scores and self-assessed health is indeed high in all Nordic countries, with Denmark in fact coming out highest of all countries in the analysis. We therefore note that the Nordic health-equality paradox is also apparent when analysing direct measures of skills and taking into account different levels and distributions of such skills and health across countries. More generally, the findings support the idea that knowledge and skills is important for explaining health outcomes in the Nordic countries.<sup>13</sup>



We provide further evidence in this respect by investigating the extent to which intergenerational inequalities in health between different socioeconomic groups are affected by our adjusting for PIAAC performance in the Nordic countries on average. As a measure of socioeconomic background, we use parental education measured in three levels: “low”, “medium”, and “high”. This measure

<sup>13</sup> Self-assessed health has also consistently been found to be a good predictor of mortality in different settings (e.g. DeSalvo et al. 2006; Schnittker and Bacak 2014).



is highly relevant as an indicator of health inequalities since, as discussed in Section 3.b, research indicates that parental education affects health outcomes of children in both a short- and longer-term perspective.

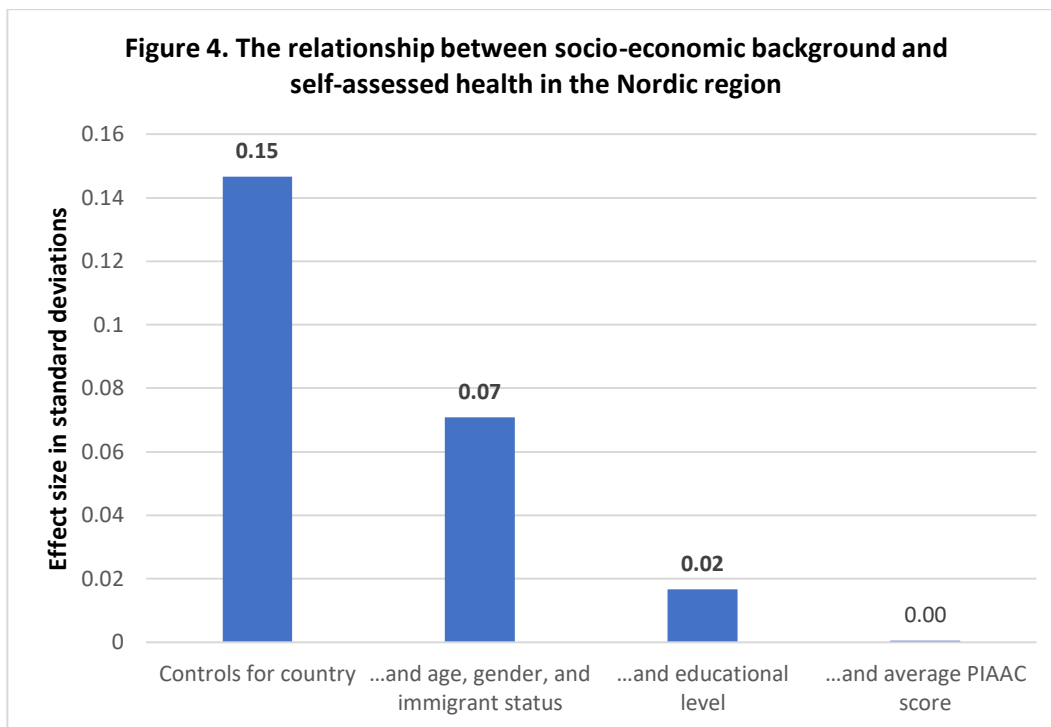
In addition, we analyse the extent to which differences in self-assessed health between natives and migrants can be traced to differences in knowledge and skills. Although there is evidence that migrants in fact have better physical health than natives in the Nordic region, there is also important heterogeneity depending on country of birth (Honkaniemi et al. 2017). At the same time, there is evidence that migrants have lower self-assessed and mental health in Nordic countries (e.g. Blom 2011; Socialstyrelsen 2009). Given that all Nordic countries have seen considerable increases in the shares of foreign-born people in the past decades, it is important to analyse the extent to which inequalities in education and skills help explain ethnic inequalities in self-assessed health in the region overall.

In these analyses, we standardise the health scale and parental educational levels to have means of zero and standard deviations of one across all participating Nordic countries, and include country indicators to adjust for systematic differences between them that affect both skills and health.<sup>14</sup> The results are displayed in Figures 4 and 5, which display how the relationship between socio-economic/immigrant background and health changes as we add further controls to the equation.<sup>15</sup>

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<sup>14</sup> Since the variables are standardised at the Nordic level, the procedure does not affect the results as such but merely the scale; it makes it easier to interpret the results. Including country-fixed effects simultaneously ensures that we only compare individuals within the same country. Both combined mean that we retrieve the average effect across the Nordic countries that participated in PIAAC. The methodology is otherwise the same as discussed in footnote 4. Again, note that we use linear models as these are generally preferable to nonlinear ones even though we study a variable that is ordinal in nature (Angrist and Pischke 2008).

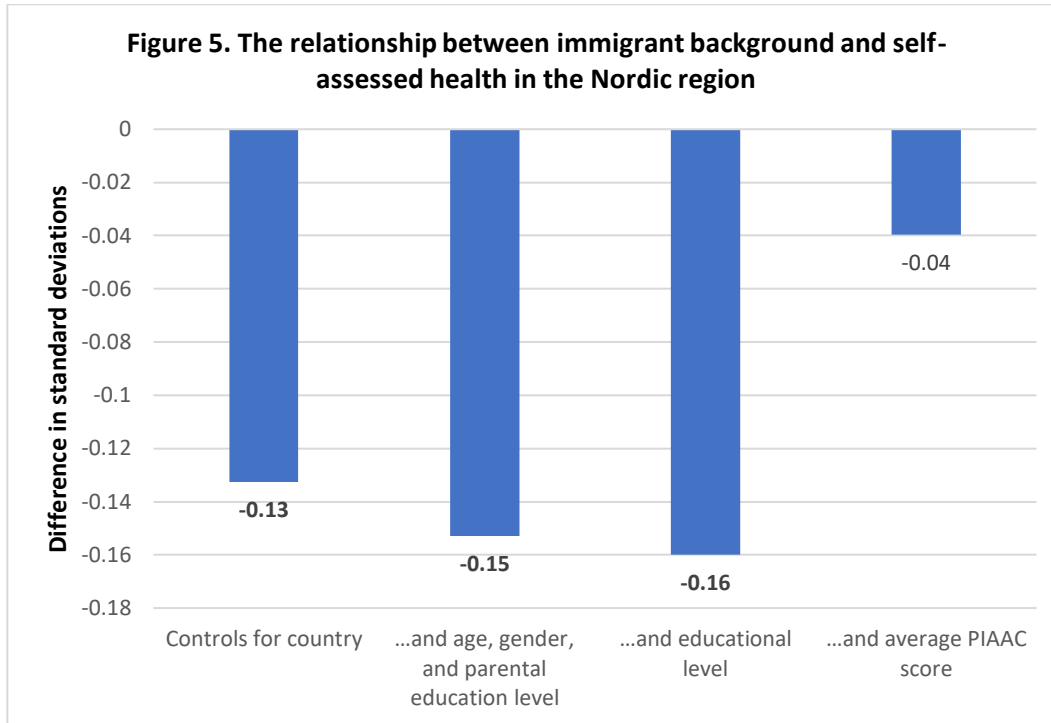
<sup>15</sup> Figures in bold indicate that the relationship is statistically significant at least at the 10 percent level.



Beginning with socio-economic inequalities, Figure 4 shows a positive raw correlation between the level of parental education and self-assessed health. When we add age, gender, and immigrant status as controls, the relationship is halved but remains rather strong. Including individuals' own educational level – also measured as “low”, “medium”, and “high” – decreases the relationship further but it remains statistically significant. However, when we include the average PIAAC score, the relationship disappears entirely. Of course, individuals' educational level picks up some of the impact of PIAAC scores as well, as higher education may both affect and be affected by such scores. Nevertheless, the results clearly indicate the importance of education and skills for understanding socio-economic health inequalities in the Nordic context.

Turning to inequalities between natives and migrants, Figure 5 displays an even more striking picture. Migrants have considerably worse self-assessed health, which is in line with previous research. Adding age, gender, and the level of parental education to the model merely increases the difference. Surprisingly, this also holds true when adding individuals' own educational level. Yet when we adjust for PIAAC scores, the relationship almost vanishes altogether and becomes statistically insignificant.<sup>16</sup>

<sup>16</sup> Figures in bold indicate that the relationship is statistically significant at least at the 10 percent level.



Interestingly, individuals' own educational levels therefore appear much more important for understanding socio-economic health inequalities than inequalities between natives and immigrants. This is likely because differences in educational levels do not reflect differences in skills to the same extent in comparisons of natives and immigrants, as in comparisons of people from different socio-economic backgrounds. This may in turn be due to systematic differences in education quality in the immigrants' home countries, as well as different skill returns of education more generally. Regardless, the results further support our principal argument: actual cognitive and non-cognitive skills, not merely investments in such skills, are key for understanding health inequalities in the Nordic region.

Of course, it is important not to draw too strong conclusions regarding causality based on the associations presented in this section; further research in this respect is clearly necessary to establish causality. Nevertheless, in combinations with the research discussed in Sections 3.a–3.c, our results do suggest a role for education policy in decreasing health inequities via improved knowledge and skills in the population. In the next section, we discuss whether or not current Nordic education policy is fit for purpose in this respect.

## 4. An Education paradigm for healthy equality

Having highlighted the importance of cognitive and non-cognitive skills – measured as performance in knowledge-based tests – for increasing health equality, this section discusses whether current education policies in the Nordic countries align with this goal. To do so, we first discuss the paradigm that has come to influence Nordic education policy in the past decades and its intellectual foundations. We then analyse the empirical research investigating how pedagogical practices associated with this paradigm affect pupil achievement and attainment, which we established in the previous section to be important from a health-equality perspective.

### A new paradigm

Between the late 1800s and World War II, the Nordic education systems were strongly influenced by German pedagogical ideas, which highlighted the development of character through knowledge accumulation. Consequently, in these systems, strong emphasis was put on traditional goals of education: to increase subject knowledge and non-cognitive skills, such as conscientiousness, self-discipline, and a capacity for hard work. This was to be achieved in hierarchical school environments through teacher-led classroom instruction. However, following the conclusion of the war, it was no longer viable to look to Germany as an inspiration for education policy, as many held its system partly responsible for the crimes its regime had committed. Consequently, a new paradigm started to influence education policy in the Nordic countries. And in accordance with this paradigm, the previous system was heavily criticised for its focus on factual knowledge and regimentation. Since “deep”, genuine learning was supposed to be exciting and joyful, the paradigm held education that did not live up to these ideals to be ineffective and wasteful (see Heller-Sahlgren 2015; Heller-Sahlgren and Sanandaji forthcoming).

The intellectual basis for the new paradigm can be traced to the publication of Jean-Jacques Rousseau’s (1889) *Émile, or On Education* in 1763. The dominant interpretation of *Émile* became the child-centred focus Rousseau believes must be the bedrock of education. He admonishes the teacher: “Do not give any sort of lesson verbally: [the pupil] ought to receive none except from experience” (Rousseau 1889, p. 56). Long lectures and lessons are boring and therefore undermine children’s natural appetite for learning, thereby leading to a “barbarous education which sacrifices the present to an uncertain future, loads

the child with every description of fetters, and begins, by making him wretched, to prepare for him some far-away indefinite happiness he may never enjoy!" (Rousseau 1889, p. 42). For Rousseau, teachers consequently become secondary in the learning process, as they become guides with the task to motivate children to find and act by their innate and natural tendency to search for knowledge on their own accords. There is consequently no place for external incentives, such as rewards or punishments, apart from those that follow naturally from pupils' actions.

While there is much to suggest that Rousseau did not believe that happiness could be equated with enjoyment, and that he did believe that pupil suffering could play a crucial role for learning, in the interpretation that has come to dominate progressive educational thinking, teaching of facts and knowledge is assumed to hinder pupils from acquiring a deeper understanding of the subjects, decreasing their joy for learning and therefore contributing to an unhappy childhood. The solution has been to individualise learning, promote pupils' own search for knowledge, and decrease the role of traditional authorities in the learning process and in schools more generally – and there is much to suggest that the spring well of these ideas was Rousseau's theory (see Heller-Sahlgren 2018a). Indeed, pedagogical giants such as John Dewey later came to favour a type of education in which pupils actively searched for knowledge and were not burdened by traditional teaching methods. Indeed, "learning by doing" has become the most famous statement associated with Dewey (1897, pp. 13–14), who complained that traditional schooling means "[t]he child is thrown into a passive, receptive, or absorbing attitude. The conditions are such that he is not permitted to follow the law of his nature; the result is friction and waste". Many other pedagogues held similar views, which also entered mainstream pedagogy via the developmental psychology of Jean Piaget and Lev Vygotsky, often described as "constructivism", whose ideas were taken to imply a much larger and independent role for pupils in the learning process (Heller-Sahlgren 2018a; Heller-Sahlgren and Sanandaji forthcoming).

These ideas became crucial for Nordic education policies in the last decades of the 20<sup>th</sup> century. To varying degrees, these policies came to officially deemphasise the importance of traditional education in favour of more progressive, child-centred ideas as well as pupil influence over decision making in policy documents and curricula. While it took longer for the ideas to take root in Finnish policymaking than in the other Nordic countries, an increasingly progressive, pupil-centred focus had become popular also in Finnish education policy by the 1990s (see Blossing et al. 2014; Carlgren et al. 2006; Heller-Sahlgren 2015).

Of course, just because something is emphasised in official policy and curricula does not mean that it is also implemented in school and classroom practice – which at the end of the day is what affects pupil outcomes. Unfortunately, there is little historical comparable data with which we can compare the extent to which practice changed as a result of shifting policy in the Nordic region. Yet the data we do have suggests that Sweden appears to have been the leader when it comes to implementing pupil-centred policy in practice, especially from the 1990s when it moved towards quite radical versions of individualised teaching models in which children took considerable responsibility for their own learning. The new methods meant that “pupils work according to their own individual plans, not the teachers’ decisions about what and when things have to be done....[and] have individual timetables where they plan for each subject one or two weeks ahead. After that, they evaluate their own work and make up new plans. They are, so to say, monitoring themselves” (Carlgren 2006, p. 306). In Norway, there is also direct evidence suggesting an increase in pupil-led teaching in the same period. While there is only suggestive evidence from Denmark and Iceland, the new paradigm does appear to have increasingly come to reflect practice in similar directions also in these countries in the last decade of the 20<sup>th</sup> century. However, this is not true of Finland, where practices remained relatively traditional and hierarchical throughout the 20<sup>th</sup> century despite shifts in official policy, most likely because teachers opposed the new ideas (Carlgren et al. 2006; Heller-Sahlgren 2015).

To some extent, the progressive paradigm has in recent decades also been supported by post-modern, relativist ideas of knowledge – which broadly speaking hold that objective truths and facts do not exist or at least cannot be observed – and these are also likely to have pushed policy and practice in a more child-centred direction by further deemphasising the importance of facts and knowledge in policy and curricula (see Henrekson 2017). The dominance of post-modernism in Nordic educational research also appears to be linked to the spread of progressive practices in so far as the methods utilised in this research have been justified by relying on post-modern theories of knowledge – and the existence of the research by itself helped entrench the view that the practices were based on empirical evidence rather than theory and anecdotes alone (Heller-Sahlgren and Sanandaji forthcoming). Nevertheless, the ideas underpinning recent moves toward individualisation and child-centred learning in the Nordic countries are a fundamentally modern phenomenon that began spreading to varying extents and in different forms across the developed world from the early 20<sup>th</sup> century onwards.

Regardless, by the end of the 20<sup>th</sup> century, there is little doubt that progressive pedagogical ideas had come to influence education policy in all Nordic countries

overall, although there was variation in the degree to which this policy had been implemented in school practices. However, earlier comparisons were hampered by the lack of comparable data in the different countries. We seek to improve the analysis below using more recent international survey data.

## Progressive teaching methods in the 21<sup>st</sup> century

In the past decade, a number of international surveys have emerged to allow us to compare pedagogical methods utilised in different countries. First, we consider data from PISA, which was created as a reliable international metric of pupil knowledge and skills and has been carried out every three years since 2000. In PISA, representative samples of pupils aged between 15 years and three months and 16 years and two months in all OECD countries – as well as in partner countries or economies – are tested in mathematical, reading, and scientific literacy. In addition to sitting the tests, pupils complete questionnaires with rich details on their background characteristics and personal views, which we use to obtain data on pupil-centred practices.

Here, we focus on practices used in mathematics lessons in the 2012 round. In PISA 2012, pupils considered the following statements regarding these lessons: “The teacher gives different work to classmates who have difficulties learning and/or to those who can advance faster”; “The teacher assigns projects that require at least one week to complete”; “The teacher has us work in small groups to come up with a joint solution to a problem or task”; and “The teacher asks us to help plan classroom activities or topics”. Pupils are asked to choose one of the following options: (1) “Every lesson”, (2) “Most lessons”, (3) “Some lessons”, or (4) “Never or hardly ever”. We use the OECD’s index of overall “pupil-centred teaching”, which is created through a factor analysis of the answers to the above statements and rescaled so that higher values indicate more pupil-centred teaching. The index has a mean of zero and standard deviation of one at the OECD level.

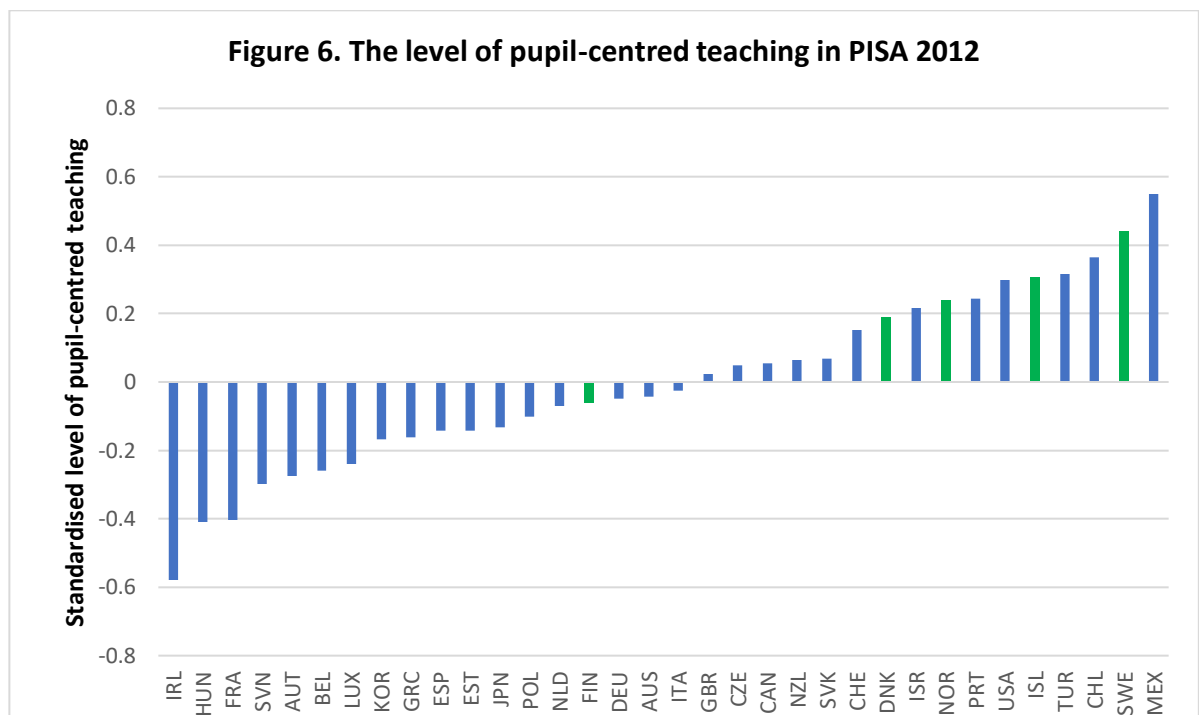
While there are data on teaching practices also in PISA 2015, we believe the statements about teaching methods in the 2012 round better reflect the degree of pupil-centred, individualised methods at a general level than the statements in the more recent PISA 2015 round, where pupils were asked to report the degree to which they use enquiry-oriented methods in science lessons.<sup>17</sup> We

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<sup>17</sup> The statements used to create the “enquiry-oriented teaching index” in PISA 2015 were: “Students are given opportunities to explain their ideas”, “The teacher explains how a science idea can be applied to a number of different phenomena”, “The teacher clearly explains the relevance of science concepts to our lives”, “Students are asked to draw conclusions from an experiment they have conducted”, “Students are required to argue about science questions”, “There is a class

therefore focus on the data from the 2012 round, while also briefly commenting on the 2015 data below.

Figure 6 shows the average score on the pupil-centred teaching index for all OECD countries. The data indicate that the Nordic countries, with the exception of Finland, score rather high in terms of pupil-centred methods. In fact, according to these data, Sweden had the second most pupil-centred teaching methods in the OECD after Mexico, and therefore the most pupil-centred methods in Europe, scoring fully 0.44 standard deviations above the OECD average. Denmark, Iceland, and Norway all score among the top ten OECD countries as well, and top five among European countries, placing themselves 0.19, 0.24, and 0.31 standard deviations higher than the OECD average. Meanwhile, Finland can be found in 20<sup>th</sup> place among OECD countries, and 12<sup>th</sup> place among European countries, scoring 0.06 standard deviations below the OECD average. Overall, therefore, while the Nordic countries' pedagogical practices appear comparatively progressive on average, Finland was still by far the most traditional country in the region in 2012.



debate about investigations”, “Students are asked to do an investigation to test ideas”, “Students spend their time in the laboratory doing practical experiments”, and “Students are allowed to design their own experiments”.



While the data on “enquiry-oriented practices” in PISA 2015 are less likely to accurately reflect individualised teaching methods, as noted above, the overall picture is in fact rather similar, but not identical, if we also take into account this measure in our analysis. Whereas Denmark and Sweden came in second and sixth place respectively among OECD countries, Norway and Iceland placed themselves in the middle – and Finland was the third most traditional country in the OECD, although it scored far higher on this measure than Japan and Korea (OECD 2016, p. 72). Regardless, combining both the 2012 and 2015 data, we still come to a similar conclusion overall: Denmark, Iceland, Norway, and Sweden score rather high in terms of the extent to which progressive methods are utilised, while Finland stands out as the most traditional Nordic country.

A similar picture emerges when analysing data from the 2013 round of the international teacher survey Teaching and Learning International Survey (TALIS). The OECD (2014) reports the share of lower-secondary teachers, regardless of subject, who state that “students work in small groups to come up with a joint solution to a problem or task” and “students work on projects that require at least one week to complete” either “frequently” or “in all or nearly all lessons” throughout the school year. In this survey, Denmark and Norway score high in terms of small-group work, while Sweden and Norway score high in terms of project work, with Iceland in the middle of the pack on both measures. Again, Finland scores at the lower end on both measures. Overall, data from TALIS therefore support the data from PISA: with the exception of Finland, teaching practices in the Nordic countries do appear rather progressive, albeit in different respects.

Still, also instruction in Finland appears to have become more pupil-centred in the past decades, albeit from a very low base, and there has recently also been a push from authorities to make teaching more progressive. Indeed, an important reason for why practice appears to have remained comparatively traditional in Finland for longer than in the other Nordic countries is that teachers ignored the reformed guidelines, but this has now begun to change. Meanwhile, the new national curriculum that came into effect in 2016 has come to increase the role of pupils in the decision-making process regarding what types of methods are used in the classroom compared with the previous curriculum (Heller Sahlgren 2015). In other words, also Finland is moving towards more progressive policy and practice overall.

A further sign of this can be found in the International Civic and Citizenship Education Study (ICCS), where pupils in 8<sup>th</sup> grade report whether they take part in decision making about how their school is run, an indicator of the overall level of pupil influence in schools. In 2009, while Norway scored the highest among all

participating OECD countries in this respect with 58 percent, Sweden scored fifth with 54 percent, and Denmark ninth with 44 percent, Finland scored the lowest of all countries with 15 percent (Schulz et al. 2010). Yet, in the 2016 round, the share in Finland had increased to 27 percent. While still low in a comparative perspective – in the same survey, Sweden came out on top with 64 percent, Norway second with 59 percent, and Denmark third with 47 percent among participating OECD countries – Finland’s increase was by far the largest in a relative perspective (Schulz et al. 2016). Overall, it therefore appears clear that also Finland has moved towards more pupil-centred practice in the past decade.

## The effects of pupil-centred teaching methods

To the best of our knowledge, no studies analyse the longer-term health effects of progressive practices directly. However, in Section 3 we established that both time spent in education and test scores are important for health production and equality of health outcomes. We therefore review the evidence of the impact of progressive methods on educational outcomes to better understand their likely indirect impact on health outcomes in a longer-term perspective.

In this review, we found little evidence that child-centred ways of working have positive effects on performance in knowledge-based tests. In fact, few interventions have been shown to decrease performance as quickly as progressive methods in the classroom. Indeed, in meta-analyses of hundreds of studies, active, teacher-directed instruction is more than three times as effective as pupil-centred methods (see Hattie and Yates 2014). These results are also supported by much evidence from the economics and psychological literature, which suggests that traditional teaching methods are clearly preferable to progressive ones from an overall learning perspective as measured by test performance (e.g. Berlinski and Busso 2017; Bietenback 2014; Cordero and Gil-Izquierdo 2018; Haeck et al. 2014; Kirschner et al. 2006; Lavy 2016; Schwerdt and Wuppermann 2011). Since test scores pick up both cognitive and non-cognitive skills, such as conscientiousness and locus of control (see Balart et al. 2018; Borghans et al. 2016), these findings suggest that traditional methods have positive effects on cognitive and non-cognitive skills combined.

In terms of distributional effects, there is evidence from Denmark indicating that progressive methods hurt pupils from lower socioeconomic background the most (Andersen and Andersen 2017). This is also backed up by research analysing PISA data from eight countries (Cordero and Gil-Izquierdo 2018). More generally, strong American research further indicates that traditional and hierarchical school environments and pedagogical methods improve test scores,

especially among pupils from less advantaged backgrounds (e.g. Abdulkadiroğlu et al. 2016; Angrist et al. 2013; Cohodes et al. 2018; Dobbie and Fryer 2011; Fryer 2014). Evidence also suggests that schools offering such environments generate longer-term educational benefits, again especially among disadvantaged pupils (e.g. Angrist, Cohodes et al. 2016; Davis and Heller 2017; Dobbie and Fryer 2015).<sup>18</sup> In addition, while there is much evidence that “direct instruction” – a type of teaching characterised by ability grouping in combination with very structured curricula and pedagogy – generates high results among lower-achieving pupils, the evidence among higher-performing pupils is not at all as certain. In fact, among gifted and very high-achieving pupils, certain versions of pupil-led methods in some situations appear preferable for the purposes of raising performance (see Heller-Sahlgren 2018b). Overall, therefore, the evidence at least indicates that less advantaged/able pupils benefit the most from more traditional teaching methods, suggesting a link to health equality from this perspective.

This idea is further supported by cognitive research, which suggests that more individualised, “discovery-based” teaching methods benefit expert learners only. This is because expert learners have already stored the information and knowledge necessary to solve problems by themselves efficiently in their long-term memory, which they then can easily transfer to their working memory when needed. However, this is not the case among non-expert learners, who first need to obtain the relevant knowledge and information and transfer it from their working memory to their long-term memory in order to remember it – which is most efficiently done through guided, structured repetition. Among non-expert learners, guided and teacher-led instruction as well as features often associated with more regimented education systems – such as memorisation, repetition, and drill – are therefore far superior to discovery-based learning. Yet, among expert learners, discovery-based methods do appear to be preferable (e.g. Kirschner et al. 2006). Given the evidence presented in Section 3, we would therefore expect more traditional teaching methods to have positive effects on health outcomes and equality in the longer term – and that child-centred methods have the opposite effect.

Importantly, however, this does not mean that progressive methods do not work in terms of generating higher immediate wellbeing at school. Indeed, in sharp contrast to the idea that children must find schooling enjoyable to learn,

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<sup>18</sup> While one study analysing health outcomes finds no short-run impact of attending one specific type of traditional school among teenagers, it does find evidence of improved nutrition and that it decreases crime among young men as well as teenage pregnancies among young women – suggesting that it may very well have positive effects in a longer-term perspective (Dobbie and Fryer 2015).

the evidence shows that progressive methods raise pupil wellbeing. This is supported by other research that finds a trade-off between how interventions in general affect pupil enjoyment/happiness and academic achievement. In other words, in contrast to the predictions of progressive educational theory, there appears to be a trade-off between academic achievement and enjoyment at school (see Heller-Sahlgren 2018a).

## New evidence from PISA

To provide further evidence on the effects of pupil-centred teaching methods in the Nordic context specifically, we turn to pupil-level PISA 2012 data covering Denmark, Finland, Iceland, Norway, and Sweden, obtained from the OECD (2018b).<sup>19</sup> As a measure of pupil-centred methods, we use the same index described in Section 4.b and the average PISA score in all three subjects as a measure of academic achievement. In addition, we also seek to identify whether or not the trade-off between achievement and wellbeing at school is apparent in the data. We therefore exploit the fact that pupils in PISA 2012 for the first time had to consider the statement “I feel happy at school”, being asked to choose one of the following options: (1) “strongly agree”, (2) “agree”, (3), “disagree”, or (4) “strongly disagree”. We recode the scale so that higher values indicate higher wellbeing at school. We standardise all three variables to have a mean of zero and standard deviation of one across the Nordic countries to allow easier comparisons of effect sizes.

In both analyses, we also include country-fixed effects, which means that we effectively only compare pupils within the same country, to adjust for all observable and unobservable differences between countries that both affect their teaching methods and pupil outcomes. In the second specification, we also include controls for age at school start, grade, gender, immigrant status, and the ESCS index, which is a broad measure of pupils’ socio-economic background. In the final specification, we swap the country-fixed effects for school-fixed effects, which means that we only compare pupils within the same school rather than within the same country. This allows us to adjust for all observable and unobservable differences between schools within countries that both affect their teaching methods and pupil outcomes.<sup>20</sup>

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<sup>19</sup> For more information about the PISA 2012 data and the sample obtained from each country, see OECD (2013b).

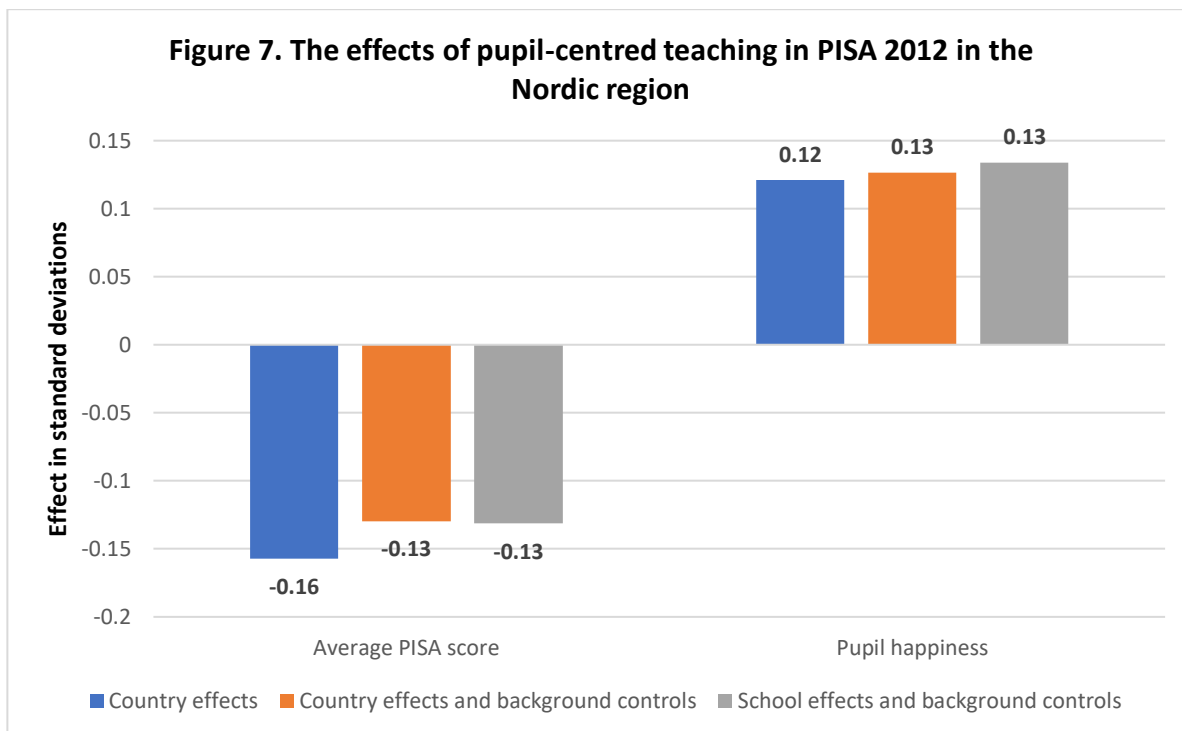
<sup>20</sup> The models weight respondents by the sample weights provided by the OECD (2018b) to ensure that the sample analysed is representative of the pupil population in each country. PISA 2012 mathematics, reading, and science scores were created from 5 plausible values each, which must be taken into account to account for uncertainty in the estimates. We therefore average each pair of the plausible values and use these to calculate the average score correctly in the models. To

The results are displayed in Figure 7. In support of the research discussed in Section 4.c, the level of progressive teaching methods is negatively related to PISA performance – but at the same time positively related to pupil happiness. Moreover, while the relationships displayed run in opposite directions, the effect sizes measured in standard deviations are almost exactly the same in both analyses. This holds true whether or not we exclude pupil-background controls and school-fixed effects. In the full model, one standard deviation more pupil-centred teaching decreases average PISA scores by 0.13 standard deviations, which amounts to about 12 PISA points, and increases pupil happiness by 0.13 standard deviations.<sup>21</sup> The findings imply that moving from the least to the most pupil-centred practices in the region – equivalent to moving from a situation where all four pupil-oriented practices are “Never or hardly ever” used to a situation where they are used “Every lesson” – would lower achievement by fully 0.75 standard deviations (69 PISA points) and increase pupil happiness by the same magnitude.

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deal with missing values on the control variables, we replace values for missing control variables with the country mean and include dummies for missing values. Standard errors are clustered at the school level to account for the fact that schools are the primary sampling unit in PISA. Since the variables are standardised at the Nordic level, the standardisation procedure does not affect the results as such but merely the scale; it makes it easier to interpret the results. Again, note that we use linear models as these are generally preferable to nonlinear ones even though one of the variables we study (pupil happiness) is ordinal in nature (Angrist and Pischke 2008).

<sup>21</sup> Figures in bold indicate that the relationship is statistically significant at least at the 10 percent level.

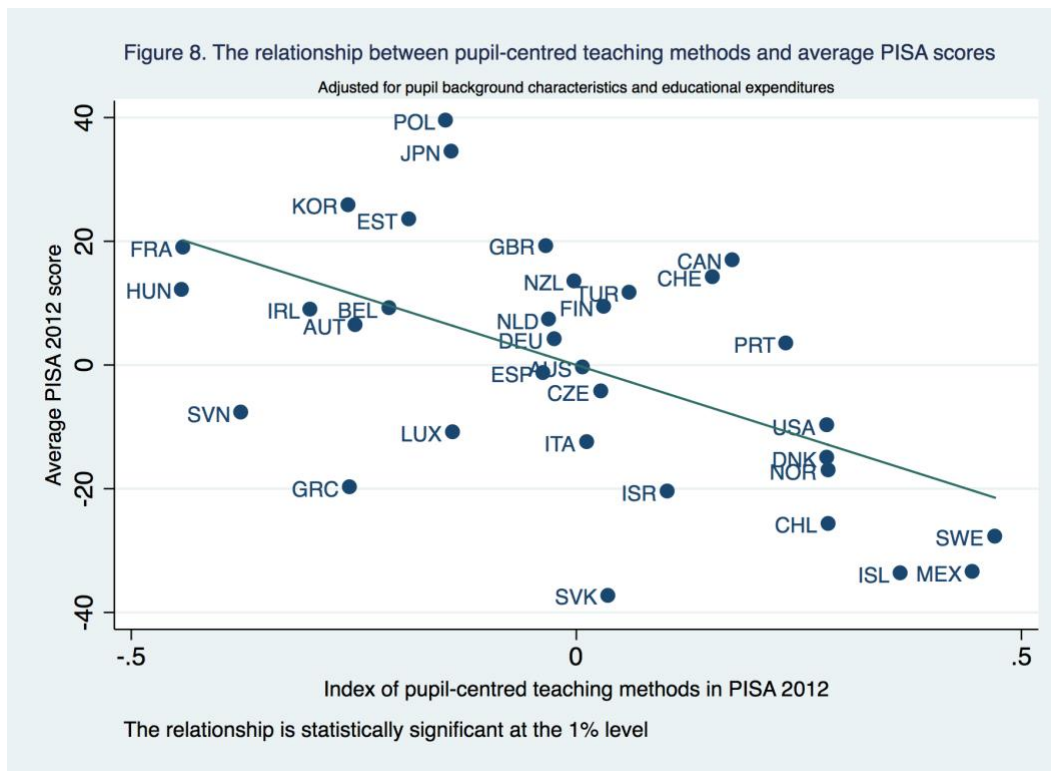


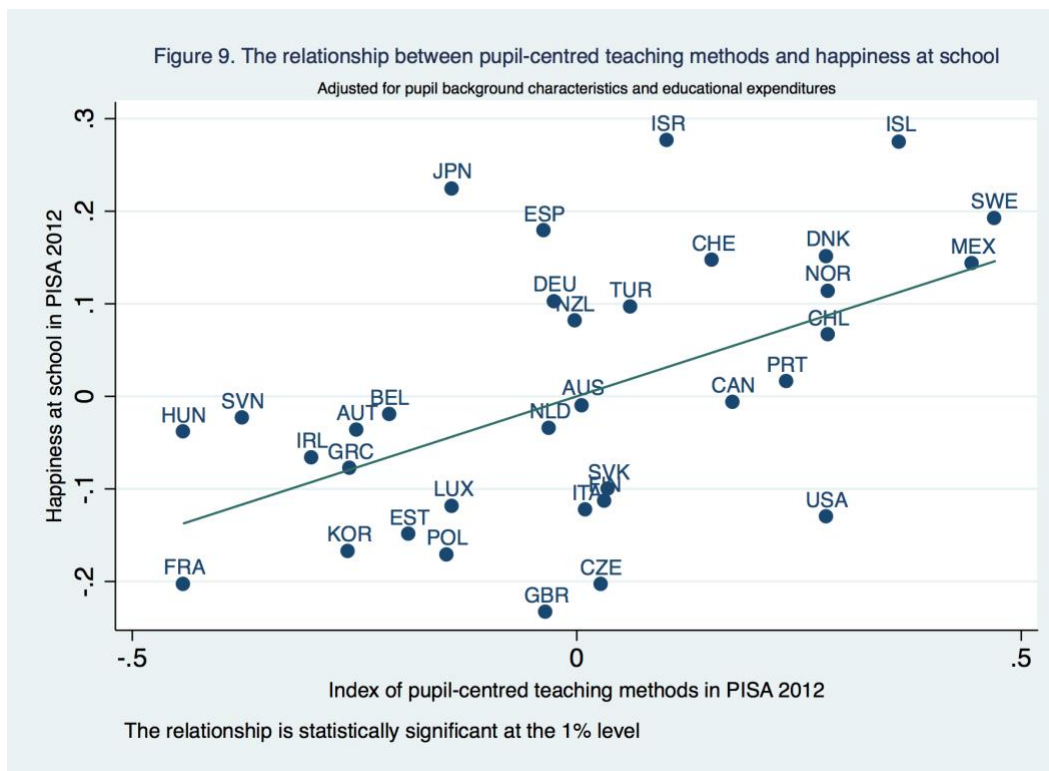
Our results using PISA data from the Nordic region therefore support previous findings that pupil-centred teaching methods, which have increasingly been implemented in Nordic classrooms, are negative for performance in tests similar to those that we found are strongly linked to self-assessed health and inequalities in such health in Section 3.f.<sup>22</sup> At the same time, such methods are positive for wellbeing at school, which has become a key goal in all Nordic countries as a result of the progressive paradigm.

In fact, the trade-off can also be illustrated also in cross-country analyses. Figure 8 shows a clear negative relationship between the average index of pupil-centred teaching methods and average PISA scores among OECD countries, once adjusting for pupils' average socio-economic background measured by the ESCS index, age at school start, grade, the share of girls, the share of pupils with an immigrant background, and educational expenditures. Yet using the same model but replacing the average PISA score as the dependent variable with average pupil happiness, Figure 9 instead shows a positive relationship between pupil-centred teaching methods and pupil happiness. The calculation indicates

<sup>22</sup> We found similarly negative effects of pupil-centred teaching methods on PISA 2012 scores in creative problem solving – which supposedly measure pupils' capacity to respond to non-routine situations – in the Nordic region, indicating that progressive methods are counterproductive in this respect as well.

that moving from the least to the most pupil-centred teaching methods in the OECD decreases countries' average PISA score by 0.54 pupil-level standard deviations (51 PISA points) and increases their average pupil happiness by 0.41 pupil-level standard deviations. The trade-off between how progressive methods affect learning and wellbeing at school therefore appears clear also at the country level.





## Performance, school enjoyment, and mental health among Nordic youth

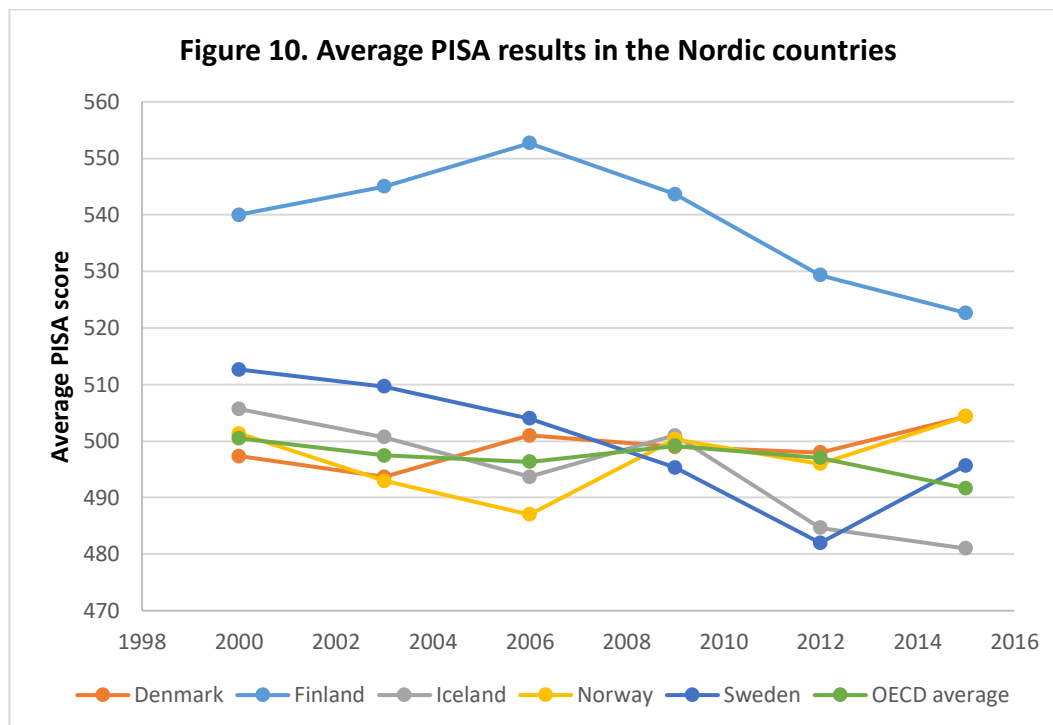
Given the evidence presented, it is perhaps not surprising that the region's pupil-performance trend for the past decades has been rather disappointing. Indeed, as Figure 10 shows, PISA scores have fallen significantly in Finland, Iceland, and Sweden since the first survey was carried out in 2000. On the other hand, while scores in Denmark and Norway, initially the lowest-performing countries, fell in the beginning of the century, they have improved since then. In turn, this leaves performance levels in Denmark and Norway slightly higher in 2015 than in 2000.

Yet since the transition to computer-based testing in 2015 has affected countries differently, it is difficult to compare scores from this year with scores from previous years (Jerrim 2018). In fact, the OECD (2016, p. 188) has specifically singled out the improvements in Denmark and Norway between 2012 and 2015 as possibly unreliable because they are related to pupils' familiarity with computers in school instruction in these countries.

Overall, therefore, it is reasonable to conclude that results have decreased in Finland, Iceland, and Sweden, while basically remaining unchanged in Denmark



and Norway. As a result, only Finland performs considerably over the OECD average, although its performance trajectory indicates this may not remain true for long if it does not change course in the near future.



Given the trade-off discussed previously, we would not be surprised if these trends are inversely related to trends in pupil wellbeing. We analyse this issue using data from the survey Health Behaviour in School-aged Children (HBSC), obtained from the WHO (2018).<sup>23</sup> In this survey, 15-year olds were asked how they feel about school at present, choosing between four options: (1) "I like it a lot", (2) "I like it a bit", (3) "I don't like it very much", and (4) "I don't like it at all". We recode the scale so that higher values indicate higher school enjoyment and standardise the scores to have a mean of zero and standard deviation of one across all participating countries and survey years.<sup>24</sup>

While we ultimately are interested in how these changes are related to longer-term health outcomes, it is not possible to study this issue directly. However, we can use the HBSC survey to analyse concurrent trends in health outcomes

<sup>23</sup> For more information about the HBSCS data and the sample obtained for the different countries, see Inchley et al. (2016).

<sup>24</sup> Since the variables are standardised across all participating countries as well as survey years, the procedure does not affect the results as such but merely the scale. It makes it easier to interpret the magnitude of the changes over time in the different countries.

among 15-year olds. We therefore create a mental-health index by predicting pupils' self-assessed health – ranging from “excellent” to “poor” on a four-step scale, which we recode so that higher values indicate better health – using indicators for (1) whether they have been feeling low, (2) felt nervous, (2) had irritability or bad temper, and/or (4) had had sleeping difficulties more than once a week in the past six months.<sup>25</sup> These are the same indicators analysed by the Swedish Public Health Agency when investigating mental-health trends in the HBSC survey (Folkhälsomyndigheten 2014). We choose to create a mental-health index in order to get an overall picture of how mental health has changed over time in the different countries.<sup>26</sup> We then standardise this index to have a mean of zero and standard deviation of one across all participating countries and survey years.<sup>27</sup>

As Figure 11 shows, school enjoyment increased in all countries between 2002 and 2014, although the magnitudes differ. Indeed, Denmark and Finland saw increases more than twice as large as Norway and Sweden. Iceland did not participate in the 2002 round but has seen strong increases since the 2006 round. At the same time as scores have fallen or stagnated since the early 2000s, average school enjoyment among pupils of the same age has therefore increased in all Nordic countries.

However, at the same time, we find no indication that the improvements in school enjoyment have been accompanied by improvements in mental health. On the contrary, as Figure 12 shows, the mental-health index declined in all countries apart from in Iceland – from which we only have data since 2006 – over the same period, thereby moving more in tandem with pupil performance. In other words, there is little reason to suggest the improved school enjoyment has improved mental health among Nordic youth.

Given that the countries have moved towards more pupil-centred teaching methods, although to varying degrees, these results should not be surprising. Of course, there are many potential reasons behind the patterns – and one should be careful in drawing causal conclusions from the separate trends alone – but

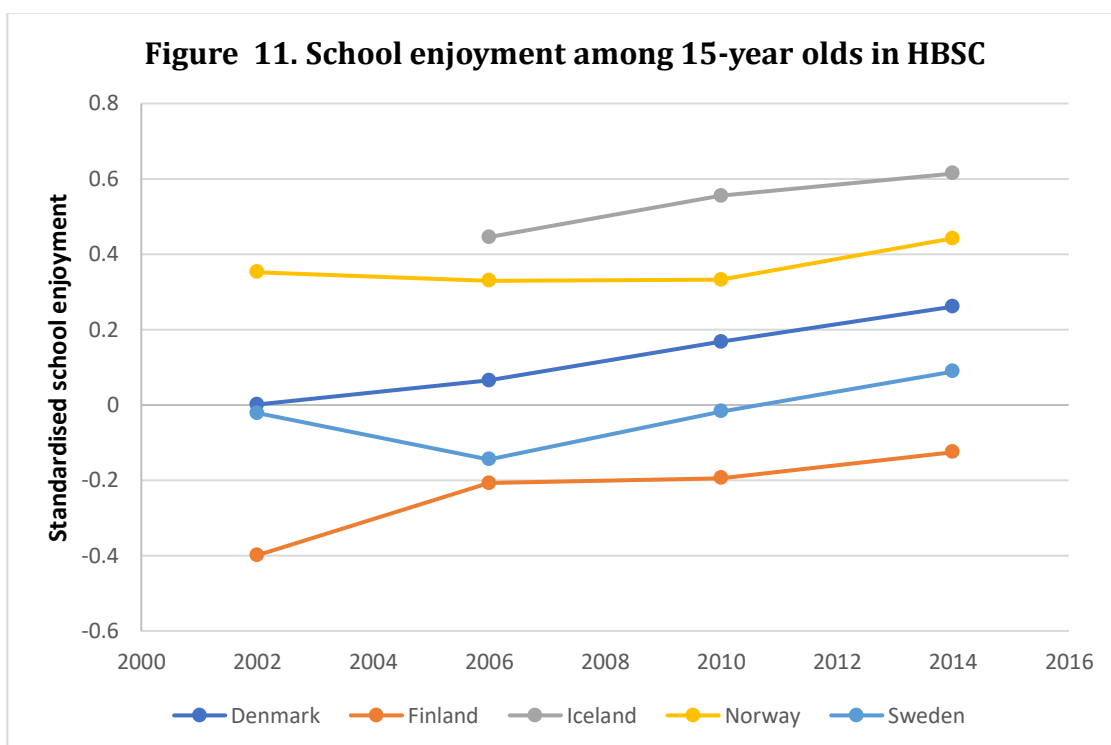
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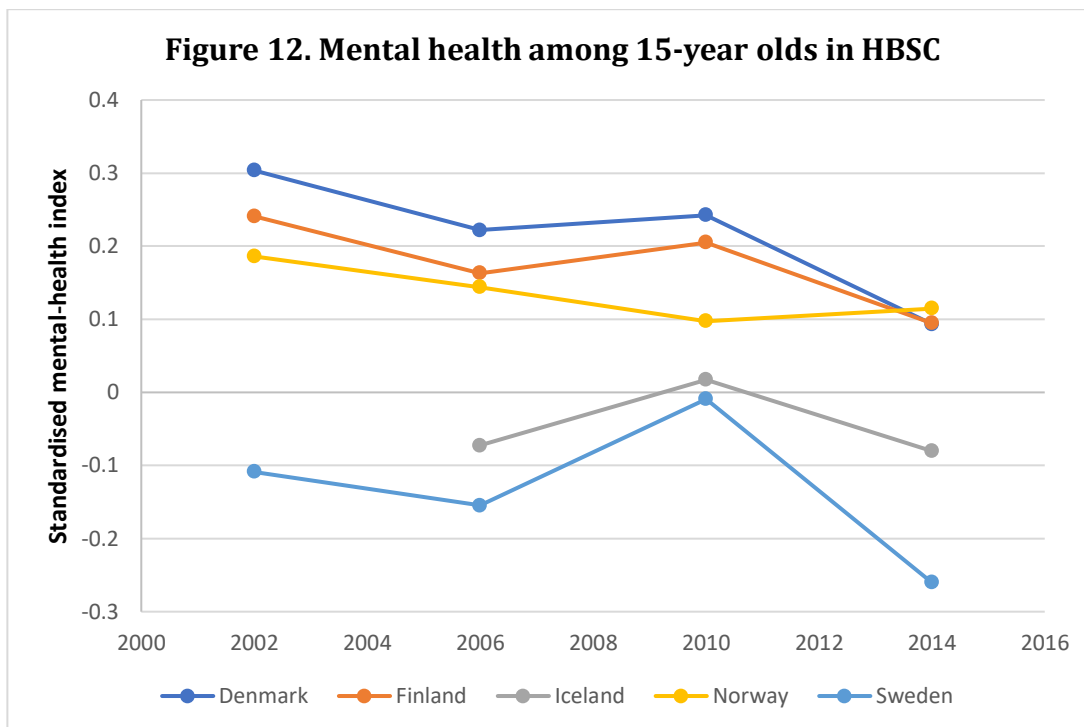
<sup>25</sup> In Finland, the respondents did not answer the question regarding whether or not they had been feeling low in the past six months in 2014. We therefore impute these observations from the other three indicators and use the imputed score when predicting the self-assessed health to create the mental-health index.

<sup>26</sup> The index is created by linear regression across all countries and survey years. Similar approaches to creating health indexes are often used in the health economics literature (e.g. Coe and Zamarro 2011; Mazzonna and Peracchi 2017).

<sup>27</sup> Again, as described in footnote 23, the standardisation procedure does not affect the results but merely makes it easier to interpret the magnitude of the changes over time.

they are broadly consistent with the trade-off between pupil happiness and academic achievement as well as the evidence on the impact of knowledge and skills on health we have presented in this report: there is much to suggest that Nordic education policy is good for school enjoyment, but bad for pupil performance on knowledge-based tests – and therefore ultimately bad for their long-term health as well.





## Implications for healthy equality

Given the link between education and skills and health outcomes, established in Section 3, and the evidence linking pupil-centred teaching with lower performance in this section, it is reasonable to conclude that the pedagogical methods utilised in Nordic countries are unlikely to promote health equality. The evidence indicates that more traditional methods and more hierarchical school environments are especially good for improving performance among disadvantaged pupils, which in the long run is likely to lead to better health and higher health equality. Nevertheless, there is little evidence that progressive methods are particularly good at improving pupil achievement more generally either, apart from among gifted and very high-achieving pupils.

At the same time, the evidence also indicates that the new progressive paradigm and methods it brought have improved wellbeing at school. This is not surprising since previous research has found that different interventions and reforms that have negative effects on achievement also have positive effects on pupil happiness and joy for learning (Heller-Sahlgren 2018a). While the progressive educational theory that Nordic countries have come to espouse is partly predicated on the idea that pupil wellbeing and effective learning go hand

in hand, there is in fact little to suggest this is the case. In other words, while proponents of the paradigm accurately predicted that child-centred methods would improve school enjoyment, they were wrong in predicting this would in turn lead to improved academic achievement.

Furthermore, the evidence indicates that mental-health outcomes among youth have not moved in tandem with school enjoyment. On the contrary, while school enjoyment has increased since the early 2000s, mental health has declined. While it is of course difficult to draw conclusions in terms of causality in this respect, it nevertheless indicates that youth mental health does not move in tandem with positive emotions about school itself.

Overall, therefore, the evidence suggests that current Nordic education policy may not be fit for purpose as a tool for promoting health outcomes and equality in such outcomes. On the contrary, it suggests that especially underperforming and disadvantaged pupils – and in fact most pupils – would be better off under a more traditional regime in the long run.

## 5. Conclusion

Despite having the most munificent welfare states and the lowest levels of income inequality worldwide, Nordic countries do not generally achieve lower health disparities than other countries, a conundrum that has become known as the “Nordic health-equality paradox”. For long, it has been assumed that education plays an important role in explaining this paradox.

In this report, we have analysed how current education policy is likely to affect health disparities in the Nordic countries. We have argued that the distribution of knowledge and skills is likely to be important for health inequities in these countries, as evidenced by the comparatively strong relationship between PIAAC scores and full-time employment.

Our review of the literature suggested a causal role for education in health production in many, but not all, contexts, supporting the emphasis on education and skills for understanding health inequalities. Importantly, we also found that relative performance in PIAAC is relatively strongly related to differences in self-assessed health in the Nordic countries, and that adjusting for such scores eradicates the relationship between parental education/immigrant status and self-assessed health in the Nordic region. In other words, cognitive performance does appear to be important for understanding social inequities in this region.

Given these results, it is conspicuous that Nordic education policy in the past decades has sought to replace traditional education goals and methods with more progressive, child-centred ideas, deemphasising the importance of facts and knowledge in favour of pupil wellbeing and the promotion of pupils’ own search for knowledge in the learning process. Yet the report has also showed differences between the countries in terms of how this philosophy has translated into pedagogical practice: overall, there is little doubt that Denmark, Iceland, Norway, and Sweden have implemented progressive practices to quite a large extent, while Finland still stands out as the country with the least progressive practices, despite official policy having increasingly come to push in this direction. Nevertheless, also Finland appears to have moved towards more pupil-centred practices in the past decade or so.

The change towards pupil-centred methods appears important from a health-equality perspective insofar as existing research suggests that more traditional types of schooling – with a strong focus on cognitive performance and non-cognitive skills, such as conscientiousness – are superior to progressive ways of working for improving achievement, especially among children from less

advantaged background. At the same time, progressive methods appear to be positive for school wellbeing, suggesting there is a trade-off between positive emotions about school and pupil performance. Using pupil-level PISA data across the Nordic countries, and cross-country data at the OECD level, we provided further evidence in this respect: the use of pupil-centred teaching methods is negatively related to PISA performance and positively related to pupil happiness.

Overall, we therefore conclude that Nordic education policy is unlikely to be fit for purpose from a public-health perspective. While the progressive philosophy induces more positive immediate school experiences, it also decreases pupils' academic performance – which in turn is likely to have consequences for their health in a longer-term perspective. The fact that both PISA scores and youth mental health have declined or stagnated, while school enjoyment has increased, in the Nordic countries offers further suggestive evidence in favour of this argument.

To decrease health disparities in the future, we therefore suggest that the Nordic governments to some extent alter their current education-policy trajectories. Rather than pushing forward in the same direction – toward more pupil influence and child-centred methods – it would be more reasonable to move in a more evidence-based direction. This includes reviewing and adapting curricula, policy documents, material in teacher-education programmes, school-inspection guidelines, and other key features of the education systems in line with what the research suggests works for promoting pupil performance. Certainly, it is far from easy to accomplish the desired changes; as we have shown, there is no direct, immediate link between the rules and regulations established in policy and the methods adopted in schools. Nevertheless, ensuring that policy encourages moves in the right direction, or at the very least does not encourage further moves in the wrong direction, would be a first step towards creating education systems that advance more equal health outcomes in a long-run perspective.

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