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Growing inequality and diverging paths in early childhood education and care: Educational disparities in Europe

Sanni Välimäki, Johanna Lammi-Taskula, Merita Mesäislehto and Johanna Närvi

Finnish Institute for Health and Welfare, Helsinki, Finland

Corresponding author: Sanni Välimäki; Email: sanni.valimaki@thl.fi

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Abstract

Early childhood education and care (ECEC) is among the most important services for children and their parents as it promotes children's development and enables mothers' employment. Previous research has shown that there is an educational gradient as children of mothers with a low education level participate less in ECEC services, but less is known about the development of this inequality. This study, using EU-SILC survey data, focuses on the development of inequality in ECEC use of children under 3 years of age during 2004–2019, and on disparities between three categories of education levels among mothers. The results show that, together with increasing ECEC participation rates, overall inequality has increased in Europe. Inequality has increased between low- and other education levels, whereas in a few cases, a decrease has happened between medium- and high-educated mothers. It is important to pay attention to socioeconomic disparities with rising participation rates.

Keywords: welfare state; early childhood education and care; inequality; social investment; childcare

Introduction

Early childhood education and care (ECEC) is among the most important services for children and their parents. It is often seen as a social investment that promotes children's development and learning and mitigates inequalities between families and children (Engster and Stensöta, 2018). Furthermore, it promotes gender equality by supporting parental reconciliation of paid employment and care responsibilities (Eydal and Rostgaard, 2015).

Previous research in Western countries has shown inequalities in ECEC use, which is reflected in lower participation rates among children from families with lower education levels and migrant backgrounds (Krapf, 2014; Petitclerc et al., 2017; Van Lancker and Pavolini, 2022). These inequalities tend to be less pronounced in countries with stronger government involvement in the availability and affordability of care (Van Lancker and Ghysels, 2016). While evidence already exists on the factors related to the unequal use of ECEC services, these studies have mostly been conducted at one reference point in time. Little is known about whether inequalities have changed in different countries over time and if so, how (cf. Van Lancker, 2018).

This study focuses on the development of inequality in ECEC use of children under 3 years of age during 2004–2019 in Europe. We compare disparities between three education levels among mothers of under-3-year-olds using EU-SILC survey data. Our study contributes to the literature in two ways. First, we use micro-level data on 21 European countries and approximately 160,000 families over a period of

15 years to analyse the development of inequalities in ECEC use at the micro-level. Second, to understand the dynamics of inequality related to ECEC use in different countries, we analyse disparities between three education classes to better capture possible differences in the use of ECEC between low- and medium-educated and between medium- and high-educated mothers and their children. Thus, we analyse the change between each pair of education groups separately. According to previous research, the low-educated have become a marginalised group in relation to employment opportunities, which is also reflected in the use of childcare services (Abrassart, 2013; Elstad, 2021). Our aim is to investigate whether the gap between medium- and high-educated is as wide as between low- and medium-educated or if low-educated are further away from the other two. Earlier search has mainly focused on the gap between low-educated and the other group. Average marginal effects (AMEs) are used for the analyses, and each country is analysed separately. Two survey years are combined to account for the slight instability of EU-SILC data and the very low number of low-educated mothers in some countries.

The paper is organised as follows. First, we describe previous research on the role of ECEC in Europe and move then more specifically to inequality in its use. Subsequently, the data and methods are presented. The results show the development of ECEC participation rates in the countries included in the study before examining the overall inequality in Europe during the study period and its development in each country. The article ends with discussion and conclusions.

Family policies and childcare in the European context

Countries, by means of policies, allocate intergenerational responsibilities between families, markets, and the state in different ways, which also impact gendered practices concerning paid employment and care work. According to differences in care arrangements, countries have often been classified along the familialism–defamilialisation continuum, having more or less publicly provided alternatives for family care such as childcare services or financial support (e.g. parental leave provisions) (Saraceno and Keck, 2010).

The institutionalisation of public childcare in Europe has taken place at the crossroads of two main policy motives: first, promoting the reconciliation of care and paid work, and second, the notion that children are in need of public education (Scheiwe and Willekens, 2009). The first has traditionally included aspects of social protection in preventing poverty and fostering gender equality by enabling women to be in paid employment and providing safe day care for children (Mahon, 2002). Increasingly, however, early childhood education has been seen as the right of children to receive education and as a social investment that aims to mitigate inequalities between children and enhance equality of opportunity in their educational and occupational careers, irrespective of their socio-economic, cultural, or linguistic backgrounds (Scheiwe and Willekens, 2009; Mahon *et al.*, 2012; Repo *et al.*, 2020).

Therefore, ECEC services are important elements of both childcare and education policies. Differences between countries in terms of gender ideologies, family values, and the understanding of childhood have led to different policies and care arrangements (Pfau-Effinger, 2005; Scheiwe and Willekens, 2009). However, different ways of addressing and allocating these care responsibilities can have different implications for social and gender equality (Orloff, 2009).

The positive effects of ECEC in many different areas have made it an important service for international organisations to promote. European Union set its first ECEC participation goals in 2002, the so-called “Barcelona target”: by 2010, at least 33 per cent of under-3-year-old and at least 90 per cent of over-3-year-old children should participate in ECEC. By 2019, 11 EU countries had yet to reach the target for those under 3 years, and overall, the participation rates varied from 4 per cent (Slovakia) to 65 per cent (the Netherlands) (OECD, 2023a). This goal was revisited in 2022 by the European Council, which stated that by 2030, 45 per cent of children under 3 years of age should attend ECEC. The council also recommended targeted measures to support the early education and care of children with disadvantaged backgrounds (European Council, 2022/C 484/01).

ECEC systems (e.g. the availability of ECEC services and how they are organised) vary across Europe, especially for younger children. In 2018 and 2019, only a few European countries guaranteed a place in ECEC for children of a very young age (6–18 months) (see Table 1), and even fewer had no childcare gap between legal entitlement to parental or childcare leave and a guaranteed place in ECEC. Thus, most families with children under the age of 3 years struggle to arrange the care of their children using informal arrangements (e.g. babysitters, grandparents, and other adults). Accessibility is better for older children, as in many countries, the focus of ECEC services changes from childcare to early education around the

Table 1. Characteristics of countries included in the study

Country	Code	Public expenditure ECEC, % of GDP ¹		Guaranteed place in ECEC ²	Demand met ²	Employment rate of mothers with 0–2-year-old children ³	
		2004	2019	2018/2019	2018/2019	2006	2019
Austria	AT	0.28	0.55			57	69
Belgium	BE	0.61	0.81			64	65
Cyprus	CY	–	–			67	67
Denmark	DK	1.33	1.24	X	X	78 ⁴	74
Estonia	EE	0.23	0.86	X	X	35	30
Greece	EL	0.01 ⁵	0.34			52	55
Spain	ES	0.41	0.47			55	61
Finland	FI	0.88	1.13	X		50	53
France	FR	1.27	1.26			55	60
Hungary	HU	0.67	0.66			12	16
Ireland	IE	0.28	0.33			57	66
Iceland	IS	1.07	1.7			–	–
Italy	IT	0.5	0.56			51	52
Luxembourg	LU	0.38	0.94			65	76
Latvia	LV	0.09	0.8	X		40	72
Netherlands	NL	0.43	0.73		X	71	78
Norway	NO	0.75	1.38	X	X	–	–
Portugal	PT	0.37	0.34			72	80
Sweden	SE	1.17	1.56		X	75 ⁵	82
Slovenia	SI	0.53	0.62	X		80	80
Great Britain	UK	0.76	0.52			53	66

Note: Changes in public expenditure on ECEC during the study period, if country guarantees a place in ECEC, if the demand for places is met, and changes in employment rate of mothers with young children during the study period.

Sources:

¹OECD (n.d.b).

²Eurydice (2019) (data are based on experts' answer from their country).

³OECD (n.d.c).

⁴Data from 2011.

⁵Data from 2009.

age of 3 years. For very young children, ECEC services have historically been understood as care services that enable parents, usually mothers to participate in the labour market. Thus, approximately one-third of European countries have limited access to ECEC or have prioritised families in which both parents work or study. The ECEC participation rates of children under the age of 3 years also reflect mothers' labour market participation and employment rates (see [Table 1](#)). For older children, ECEC services are more often understood as part of the education system, supporting child development and preparing them for primary education, although systems that integrate these two approaches have also become more prominent. Thus, the participation rates of older children could be high even in countries that do not have any legal framework to ensure a place in ECEC (one-quarter of European education systems) (Eurydice, 2019).

In addition to entitlement and availability, affordability is another important aspect of ECEC services for parents. Most European countries have fees for ECEC, and only a few offer free public ECEC (with possibly limited hours) for the youngest children. Monthly ECEC fees for children under 3 years are the highest in countries that rely on market-driven mechanisms to supply ECEC to this age group. To include the most vulnerable groups of children, many countries also offer fee reductions or priority access to certain groups (e.g. children living in poverty, children of single parents, and children with disabilities) (Eurydice, 2019).

Public spending on ECEC also varies notably between countries, although in most countries, it increased throughout the study period. In 2004, EU countries used an average of 0.52 per cent of their GDP on the ECEC, whereas in 2019, the share increased to 0.75 per cent. In 2019, Ireland used the least (0.33 per cent of its GDP), while Iceland used the most (1.7 per cent of its GDP) (OECD, *n.d.b*). [Table 1](#) presents the development of public spending in the countries included in this study during the study period. It should be noted that these figures include spending for both children under three years old and children over three years old, and data are not available separately for each age group. In some countries, higher spending may reflect compulsory participation of older children.

Inequalities related to ECEC

Earlier research on childcare has pointed to different factors of social stratification related to formal childcare use at both the individual and institutional levels (Van Lancker and Ghysels, 2016; Petitclerc *et al.*, 2017; Van Lancker, 2018; Ferragina and Magalini, 2023). Since women are typically the primary caregivers of children, it is mostly the mother's socio-economic background that influences the use of childcare. Additionally, immigrant children in Europe are less likely to participate in formal early education and care (Van Lancker and Pavolini, 2022).

In previous research on the unequal use of ECEC, different methods for measuring inequality have been applied. These include family income (Van Lancker, 2018) and mother's social class (Pavolini and Van Lancker, 2018; Ferragina and Magalini, 2023). The most frequently used characteristic is education (Van Lancker and Ghysels, 2016; Krapf, 2014; Wood *et al.*, 2023). Overall, education level is related to several aspects of well-being. For example, higher educated people are healthier (Albert and Davia, 2011) and less likely to be poor (Hofmarcher, 2021). In addition, those with a high education level more often support gender egalitarian values (Salin *et al.*, 2018). The importance of education has led governments to invest in it, resulting in a rapid rise in education levels among young adults around the world (OECD, 2022). The expansion of education has also meant that the social position of low-educated people has weakened in many countries. For example, they are more disadvantaged in the labour market (Abrassart, 2013; Elstad, 2021), and relative inequality in health and mortality is increasing between educational groups (Mackenbach *et al.*, 2015; Linder *et al.*, 2020).

Different reasons have been suggested for disparities in childcare solutions between mothers. For example, the lower use of childcare services by lower-educated mothers has been explained by their weaker labour market opportunities compared to higher-educated mothers (Biegel and Maes, 2022; Wood *et al.*, 2023). Lower-educated mothers also work more often in jobs with irregular working hours

and short, temporary contracts. This instability may cause difficulties in finding an ECEC place for a child, especially if accessibility is a problem (Vandenbroeck, 2020).

Problems in accessing ECEC have often been understood as the main factor explaining inequality in participation. These problems stem from the lack of availability and the high cost of ECEC. In 2018, only eight European countries guaranteed an ECEC place for children under the age of 3 years, while the demand for childcare for young children was higher than the supply in most European countries (Eurydice, 2019; see Table 1). Furthermore, the cost of childcare places more strain on lower-educated mothers, as it may be economically more beneficial for them to stay home and take care of their child than to work in a low-paying job and pay high childcare fees. According to Pavolini and Van Lancker (2018), these kinds of structural constraints drive European inequalities.

Additionally, although inequality in childcare use is generally lower in countries with better accessibility to ECEC services, other factors seem to contribute to families' childcare use. Irrespective of the level of investment in public childcare, socio-economic differences in ECEC use have been found to be particularly high in countries in which the male breadwinner model is traditionally supported instead of the dual earner/dual carer model (Ferragina and Magalini, 2023). Thus, at the individual level, cultural factors and attitudes can play a role in differences in ECEC use and the division of care responsibilities more widely (Krapf, 2014; Abrassart and Bonoli, 2015).

Previous comparative research on inequality in ECEC participation (Van Lancker and Ghysels, 2016) has shown that countries with long and well-paid parental leave, on the one hand, or low-quality childcare services, on the other hand, have more inequality in ECEC use. Meanwhile, countries that provide legal entitlement to ECEC or have more subsidised places have lower inequality. More public spending on ECEC correlates with higher use of ECEC, but is not directly associated with the development of inequality in ECEC (Van Lancker, 2018).

Based on earlier research, three hypotheses were formulated for the analysis. Our first hypothesis is that as the overall use of ECEC has increased, the inequality in ECEC use has decreased. The more children are enrolled in ECEC, the more there will be children from different backgrounds. Our second hypothesis is that the largest participation gap can be found between the low- and high-educated. The polarisation of these groups has been found in previous studies. Our third hypothesis is that disparities between medium- and high-educated mothers have decreased faster compared to pairwise comparison of low- and medium- educated. Since the share of the low-educated has decreased during the study period, we assume they have become a more marginalised group.

Data and methods

Data

For the analysis, we used EU-SILC population survey data (European Union Statistics on Income and Living Conditions). The data are collected by national statistical agencies, and the collection of the data is coordinated by Eurostat. The data include all EU countries, as well as Iceland, Norway, Switzerland, and Serbia. These data have been used in several previous studies on ECEC (e.g. Krapf, 2014; Van Lancker and Ghysels, 2016), as they include information on children's weekly day care hours. Eurostat uses EU-SILC data as an official source of ECEC participation rates and in the follow-up to the Barcelona targets. This study used cross-sectional data from 2004 (the first year of the EU-SILC) to 2019. The year 2020 was excluded because the use of ECEC differed illogically from earlier years in many countries. We believe this could be due to the COVID-19 pandemic.

After excluding some countries owing to small sample size or data inconsistencies, the final analysis included 21 countries. Of these countries, five (Cyprus, Hungary, Latvia, the Netherlands, Slovenia, and the United Kingdom) did not participate in 2004, and two (Iceland and the United Kingdom) did not participate in 2019. All the other countries participated in the survey annually. The total sample consists of 160,999 mothers of under-3-year-old children. The annual sample varied, on average, from 960 mothers in Italy to 266 mothers in Cyprus. Table A1 shows the distribution of observations per country.

While the EU-SILC is used as official data for statistics on ECEC participation rates in the EU, some uncertainties in the data have been identified in previous studies (e.g. Siren *et al.*, 2020). The main challenges are related to small sample sizes in some countries but also the ECEC participation rates, which for some countries and years include unexplained variation. Because of this instability, especially when looking at the development over many years, the decision was made to pool two consecutive survey years. The repeating panel of the EU-SILC may mean that some children appear in the data multiple times, but it is impossible to track this (see Iacovou *et al.*, 2012). However, the likelihood of this happening is fairly small and we do not believe this affects the analysis.

Variables

The variables used in the models include a child's participation in ECEC and the mother's education level. To study the use of ECEC services, we used information on how many hours per week the youngest under 3-year-old child of each respondent participated in ECEC. We used EU-SILC's official definition of ECEC, which includes childcare centres, preschools and compulsory education as formal childcare and excludes other types of care, such as childminders or informal care providers (e.g. grandparents). Families whose children attended ECEC for at least 1 hour a week were coded as users of ECEC services. Some cross-country differences exist in the number of hours of ECEC use; however, in most countries, the average is 30 hours or more.

Mother's education level was coded according to the International Standard Classification of Education and included three categories: low, medium, and high. Between 2004 and 2019, the distribution of people's education levels changed, especially as young adults' education levels rose (OECD, 2022, p. 46). This is evident in our data, as the average share of low-educated mothers decreased from 17 per cent to 9 per cent during the study period. Combining the two survey years also stabilised the data according to education. However, the results show illogical stark changes in the development of inequality for pair comparisons involving low-educated mothers, especially for recent time points. [Table A1](#) shows the average percentage of low-educated mothers per country.

Regarding other variables, we ran models with additional control variables (mother's age, migrant background, and the number of under 5-year-olds in the household). However, the AME values for mother's education did not change significantly. Therefore, control variables were not included in the final model. We also chose not to include variables like income or employment as they are both connected to the use of ECEC. We wanted to focus solely on education.

Analytical methods

To analyse inequality in ECEC use, we ran logistic regression models on the youngest child's participation in ECEC, with an interaction between the mother's education level and time point separately for each country. To illustrate the differences in ECEC use between the three education groups, we used AMEs to show the effect of a change in the dependent variable (here, ECEC use) on the predicted probability of the independent variable (mother's education level). AME was calculated at each time point for all education level pairs (low versus medium, low versus high, and medium versus high). For the overall inequality in a country, we used the average of each time point's AMEs ([Figure 1](#)).

The development of inequality ([Table 2](#)) was determined by examining the AMEs at each time point, and countries were categorised according to the type of change observed in the levels of inequality. This was performed by two authors separately, followed by a discussion with a third author for the categories on which there was disagreement. In certain countries, the results fluctuated so much that the development was too difficult to categorise, while in other countries, the categorisation was made with some uncertainty. These are marked in [Table 2](#) by * next to the development category. The AME values for each country and time point are shown in [Table B1](#).

As robustness checks, we employed income quintiles as an alternative measure of inequality because the amount in each subgroup would be more stable than education. However, the values still changed drastically for some groups, similar to the changes observed for some countries' low-educated mothers. Therefore, this did not bring the desired stability, leading us to retain education as the primary measure of inequality. When examining the overall development of inequality using these two alternative model versions, the picture looked the same as that of education only.

Results

The results begin with a description of how the ECEC participation rates developed from 2004 to 2019 in different countries. Thus, the focus is on educational inequality in ECEC use. First, we examine the level of inequality among the countries during the study period. We then analyse possible changes in inequality in Europe before moving on to analyse each country individually. This inequality is shown separately for each education pair.

Figure 1 shows how the ECEC participation rates for children under 3 years of age changed during the study period. We can see that the rates vary across countries, with Denmark having very high participation throughout the study period, and Austria, Hungary, and Ireland having low participation. Overall, participation has risen markedly in all countries except Denmark, where it has decreased slightly, and Sweden, the United Kingdom, and Italy, where the rise has been slower. Interestingly, a strong rise in participation rates has occurred both in countries that had medium participation at the start of the study period (e.g. Luxembourg) and in countries where the rate was originally very low (e.g. Estonia and Greece).

Figure 1 also shows the average rate of inequality in the country during the study period according to the mother's education level. In this figure, we use an average to give context to what inequality looks like before moving on to see the actual development. Overall, the most common disparities are between low- and high-educated mothers in Europe. Looking at the difference between medium-educated and other types of mothers, we can see that inequality is usually low with the other pair and high with the other pair (e.g. see Luxembourg and Denmark). This means that medium-educated mothers of young children most often use ECEC similar to either low-educated or high-educated mothers. More rarely do they form a "middle group" of their own as users of ECEC.

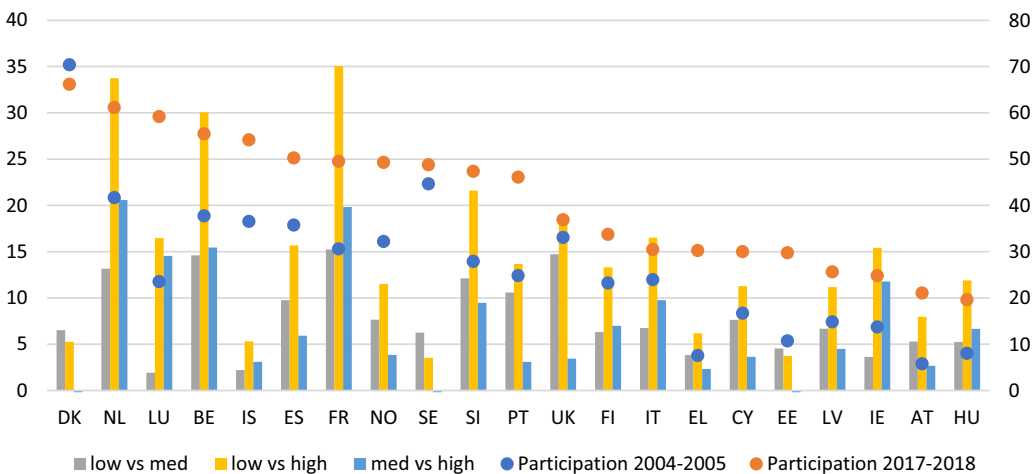


Figure 1. ECEC participation rates and inequality during the study period.
 Note: The figure shows overall inequality in ECEC use according to mother's education level (average AME during the study period, left y-line) and every country's ECEC participation rate of under-3-year-old children at the start and end of study period (% of children under 3 years, right y-line).

Table 2. Development of inequality in ECEC use by country

	Low vs. med	Low vs. high	Med vs. high
AT	↑	↑	↔
BE	↔	↔	↔
CY	↑*	↑	↑
DK			↔
EE	↔	↔	↔
EL		↔*	↔*
ES	↔*	↑*	↑*
FI		↔	↔
FR	↑	↑	↔
HU	↑	↑	↑
IE	↑		↓
IS		↑*	↔
IT	↔	↑	↑
LU	↔*	↔*	↓*
LV	↔*	↔*	↔*
NL	↔*	↔	↓
NO		↓*	↓
PT	↓	↑	↑
SE		↔	↔
SI	↑	↑	↔
UK	↓	↓	↔

Note: This table shows the development of inequality in ECEC use according to pairwise comparison of education groups.

The Netherlands, Belgium, and France stand out as countries with high levels of inequality among all education groups. Meanwhile, Denmark, Sweden, and Estonia, on average, have a negative rate of inequality between high- and medium-educated people, but for this figure, inequality has been set to 0 (their averages vary from -1 to -3). A closer look at inequality development yields interesting results.

Figure 2 shows how inequality in the ECEC participation of children under 3 years of age according to the mother's education level changed overall in Europe during the study period. The figure shows that inequality between low- and high-educated mothers is much more common than inequality between other education pairs. This makes sense, because these two education groups are the farthest from each other. It can also be seen that the overall level of inequality was stable between all education pairs; however, in the latter part of the study period, an increase occurred. Figure 2 shows the average from every year. When looking at the countries' development separately, the picture changes as can be seen next.

When examining the countries individually, the development of inequality appeared to differ. As shown in Table 2, although there are more countries where inequality has increased in multiple groups, there are also countries where inequality has decreased between groups. However, there were many

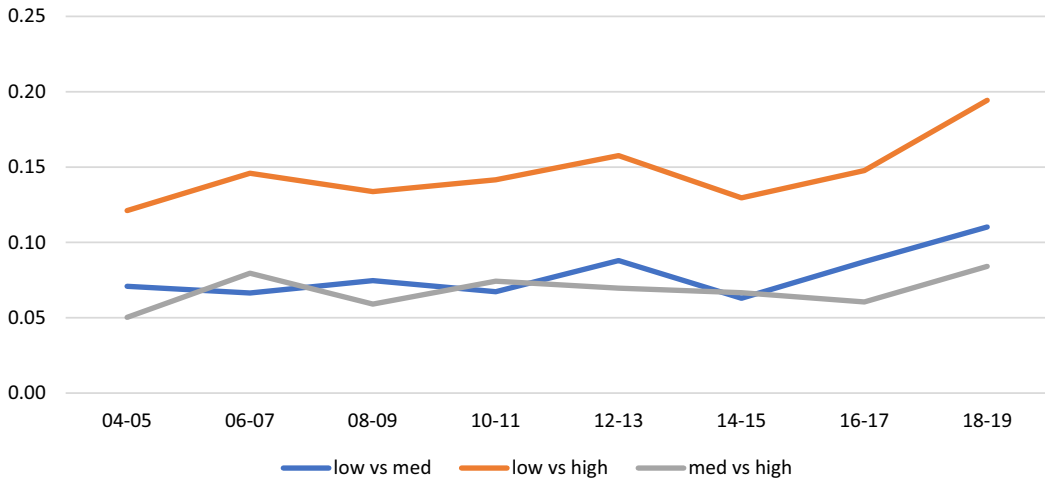


Figure 2. Overall development of inequality in ECEC use.

Note: The figure shows the overall development of inequality in ECEC use according to mother's education level in Europe, 2004–2019, AME.

variations. An increase in inequality has mostly taken place in pairs with lower-educated mothers and in multiple pairs in a country, whereas a decrease in inequality has most likely happened only in one pair, most often between medium- and high-educated mothers. However, in most countries, inequality remained constant throughout the study period.

When looking at the rise in ECEC participation rates among young children, overall inequality, and the development of inequality, we can group some countries together. Austria, Cyprus, Italy, Hungary, and Slovenia had low participation rates at the start of the study period and witnessed an increase in participation, combined with an increase in inequality between almost all education pairs. In Estonia and Greece, participation rates were also very low, but as they rose quickly, there was still very low inequality between education groups. Meanwhile, Ireland and the United Kingdom are very special, as they have a low participation rate that has grown slowly. However, in the United Kingdom, there has been a decrease in inequality, and for Ireland, there has been both an increase and a decrease between different education groups.

As for countries where the participation rate in ECEC has been higher than average, there are many different stories. France, Belgium, and the Netherlands all have very high overall inequality, but development is different in every country during the study period. In Belgium, there is no change in inequality; in France, there is a rise in low education pairs; and in the Netherlands, there is a decrease between medium- and high-educated mothers. Denmark and Sweden had high participation rates throughout the study period, and the level of inequality remained low. In Luxembourg and Norway, participation rates have been growing and the difference between medium- and high-educated mothers has decreased.

Conclusions and discussion

This study examined cross-country differences in the development of inequality in ECEC use in Europe in 2004–2019. Using data from the EU-SILC for 21 European countries, we analysed whether a mother's education level is associated with her youngest under-3-year-old child's participation in ECEC across countries and over time. We conducted a pairwise analysis of three education levels.

Our initial hypothesis, which posited that the inequality in ECEC participation would diminish as the participation rate increased, was not confirmed by this study. Our results show that while ECEC participation rates have increased in almost all countries in the sample, and in some of them very

significantly, the overall educational inequality in ECEC use in Europe has also increased. In most countries, the increase in inequality has taken place in multiple education pairs, whereas in the few countries in which inequality has decreased, the change has occurred only between medium- and high-educated mothers. In many countries, the level of inequality has remained stable between educational pairs.

Our results are partly in line with the findings of Ferragina and Magalini (2023), who show that despite investments in public childcare and increased rates of ECEC use, socio-economic differences remain high in many countries that have traditionally supported the male breadwinner model. However, overall, it seems that an increase in participation often means that inequality in the country also increases. This contradicts Van Lancker's (2018) suggestion that inequality decreases as ECEC participation rates increase. A decrease in inequality has occurred in Norway and Luxembourg, where participation was already high at the start of the study period. However, the opposite occurred in many countries with lower initial participation rates. For example, Austria, Cyprus, and Slovenia have increased both participation and inequality. Meanwhile, Estonia and Greece are exceptions, as even with a significant rise in participation, inequality has remained low. Our results thus show that an increase in ECEC participation does not invariably lower inequality.

In previous research, country differences in ECEC participation rate have been explained by policy context as well as cultural factors (Gambaro *et al.*, 2014; Petitclerc *et al.*, 2017). In countries with more liberal policy context, services are more market based, and child development is viewed as the responsibility of families. Conversely, in countries with a more social-democratic welfare state, the responsibility is seen as more shared, and services are more universal. We thus tried to make sense of the country variation by reflecting on the institutional characteristics of the countries (Table 1). In Luxembourg, Latvia, the Netherlands, and Norway, where inequality remained unchanged or decreased during the study period, there was a significant increase in public spending on ECEC during that time. Furthermore, most countries that in 2018/2019 guaranteed a day care place for young children (Eurydice, 2019) showed stable inequality. For example, Estonia maintained a lower level of inequality despite a significant increase in ECEC participation rate. This aligns with a previous study by Van Lancker and Ghysels (2016), who found that countries that guarantee an ECEC place have lower inequality. We can thus say that universal, subsidised, and affordable ECEC services are likely to increase the participation rate and decrease socio-economic selection.

In many countries, there are still supply-side problems, such as a lack of availability (Pavolini and Van Lancker, 2018; Woods *et al.*, 2023), and formal service provision does not meet the need based on parental employment. The association between ECEC use and mothers' employment has been found in earlier studies (e.g. Zoch, 2020). In Europe, the employment rate of women is generally lower than that of men. In most countries, the rise in employment of mothers of children aged 0–2 years has been moderate, although in some countries (e.g. Austria, Latvia, Luxembourg, and the United Kingdom), the rise has been significant.

The country variation in ECEC participation rates can thus also reflect the gendered labour market situation in each country. For example, the gender difference in employment rate is larger in southern European countries and in some of the former Soviet countries, as well as in Ireland, whereas in Baltic countries and in Finland the gap is relatively narrow (Eurostat, 2023). Furthermore, country variation in the inequalities in children's participation in ECEC could be related to educational disparities in the employment rate of parents. In countries with an initially low participation rate, the new places in ECEC have most likely been taken up by children of higher-educated parents, which has driven the increase in inequality. In countries with a high participation rate to begin with, such as Luxembourg and Norway, it could be assumed that most high- and medium-educated parents already had their children attending ECEC and the increased participation came from less-educated families.

Greece is an example of a country where an increase in ECEC participation rates has not been combined with increasing inequality. This may be due to a combination of institutional and labour market characteristics. In Greece, low-educated mothers working in the service sector, such as hotels and restaurants, may need to return to work relatively early as the parental leave for employees in the private

sector is less generous than in the private sector, and work-family reconciliation is supported by lower childcare fees for low-income families (Eurydice, 2023).

Our second hypothesis was confirmed as general differences in ECEC use were the largest between low- and high-educated mothers compared to the differences between low- and medium-educated mothers or between medium- and high-educated mothers. The second largest inequality was between low- and medium-educated mothers. A pairwise comparison of the three education groups revealed new aspects of the behaviour of medium-educated mothers. It seems that medium-educated mothers most often behave similarly to high-educated mothers, and only in a few countries (e.g. Luxembourg and Ireland), they behave more like low-educated mothers.

Our third hypothesis anticipated that the decrease in inequality would be more rapid between medium- and high-educated individuals compared to other educational pairs. Overall, there was indeed a decrease in inequality between medium- and high-educated in most countries, but at the last time point, inequality in the pair had increased. The largest increase in inequality was found in pair comparisons involving the low-educated. It appears that, as in the labour market (Abrassart, 2013) and health (Mackenbach et al., 2015), this group is becoming more marginalised. During the study period, the proportion of low-educated mothers has also decreased rapidly. They are becoming a more selected group with potentially multiple social and economic challenges. This makes it even more important for their children to participate in ECEC to prevent the developmental gap between them and other children from widening.

The findings of our analysis demonstrate that when looking at educational inequality in ECEC use, it is important not only to consider differences between higher and lower levels of education but also to include a third education level (i.e. medium educated) in the analysis. During the past decade, there has been a significant change in the educational structure of the working-age population in Europe, as the number of employed people with a low education level has decreased, and the number of those with a high level of education has increased (Eurostat, 2023). The low-educated are thus an increasingly smaller and marginalised group, and comparisons between them and the higher-educated can obscure the dynamics between medium- and high-educated groups, to which most mothers belong. Doing so allowed us to more closely study the dynamics of inequality related to ECEC usage. Still, while the small number of respondents with the lowest education level is likely to create also practical problems in a more detailed survey data analysis, we found it important to include it as a separate group to contribute to the study of vulnerabilities and related policies targeted at families.

Our study also raises questions regarding the use of EU-SILC as research data. The low number of mothers with children under 3 years of age creates a challenge for stability. We recommend using at least 2 years to account for fluctuations in the number of respondents for more stable results. Using only 1 year could yield very different results compared to using an additional year.

Even when the original Barcelona target of young children's participation in ECEC has been reached in many countries, the aim of social inclusion might not always be realised, as children with a higher risk of marginalisation owing to low parental education do not attend early education to the same extent as those with higher-educated parents. To better evaluate and promote the social sustainability of European societies, it is important to closely follow not only participation rates but also the various aspects of inequalities related to the use of early education and care services. Countries with high inequality, especially those with rising inequality, can learn from other countries' policies to prevent and decrease social inequalities between children.

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APPENDIX A

Table A1. Countries involved in the analyses and their statistics: number of observations, average amount of observations per time point, average distribution of low-educated mothers per year

Country	Code	Full N	Average N per timepoint	Average % of low-educated mothers per year
Austria	AT	5 638	705	10
Belgium	BE	6 428	804	9
Cyprus	CY	3 994	499	7
Denmark	DK	5 080	635	9
Estonia	EE	5 865	733	9
Greece	EL	7 171	896	8
Spain	ES	12 426	1,553	23
Finland	FI	10 820	1,353	5
France	FR	11 605	1,451	6
Hungary	HU	6 593	824	10
Ireland	IE	6 261	783	7
Iceland	IS	4 533	567	20
Italy	IT	15 366	1,921	20
Luxembourg	LU	6 538	817	20

(continued)

Table A1. *Continued*

Country	Code	Full <i>N</i>	Average <i>N</i> per timepoint	Average % of low-educated mothers per year
Latvia	LV	4 622	578	10
Netherlands	NL	10 018	1,252	7
Norway	NO	6 844	856	14
Portugal	PT	5 114	639	34
Sweden	SE	7 380	923	9
Slovenia	SI	9 369	1,171	4
Great Britain	UK	9 334	1,167	6

APPENDIX B

Table B1. Average marginal effects per country per time point between all educational pairs. The first named group in the name is the reference group. Results should be interpreted as follows: for example, in Belgium, 04–05 medium-educated mothers’ children have been in day care 14 percentage points more often than low-educated mother’s children have been

	AT			BE			CY		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	−0,01	−0,02	−0,02	0,14	0,30	0,16	−0,08	−0,04	0,04
06–07	0,03	0,03	0,00	0,10	0,28	0,17	0,05	0,03	−0,02
08–09	0,06	0,07	0,01	0,16	0,26	0,10	0,14	0,09	−0,05
10–11	0,07	0,11	0,04	0,16	0,35	0,18	0,09	0,06	−0,03
12–13	0,03	0,06	0,03	0,08	0,31	0,23	0,03	0,09	0,05
14–15	0,06	0,15	0,09	0,12	0,27	0,15	0,14	0,21	0,07
16–17	0,05	0,08	0,03	0,26	0,33	0,07	0,13	0,18	0,05
18–19	0,13	0,15	0,02	0,15	0,32	0,17	0,10	0,28	0,18
	DK			EE			EL		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	−0,02	−0,05	−0,02	0,06	0,03	−0,02	0,06	0,07	0,01
06–07	0,15	0,11	−0,04	0,05	0,07	0,02	0,08	0,08	0,00
08–09	0,06	0,02	−0,03	0,05	0,04	−0,01	0,01	0,07	0,05
10–11	−0,08	0,01	0,09	0,03	0,03	−0,01	0,00	0,08	0,08
12–13	0,20	0,17	−0,03	−0,04	−0,03	0,01	0,09	0,15	0,06
14–15	−0,06	−0,10	−0,04	0,13	0,09	−0,04	0,06	0,10	0,04
16–17	0,09	0,05	−0,05	0,03	0,00	−0,03	0,04	0,03	−0,01

(continued)

Table B1. Continued

	DK			EE			EL		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
18–19	0,18	0,20	0,02	0,05	0,05	0,01	−0,03	−0,09	−0,05
	ES			FI			FR		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	0,10	0,12	0,02	−0,01	0,08	0,08	0,10	0,27	0,17
06–07	0,09	0,09	0,01	0,12	0,17	0,05	0,10	0,27	0,17
08–09	0,11	0,24	0,12	0,03	0,13	0,09	0,14	0,36	0,21
10–11	0,04	0,16	0,12	0,12	0,19	0,07	0,10	0,36	0,26
12–13	0,23	0,16	−0,07	0,08	0,14	0,06	0,14	0,37	0,22
14–15	0,07	0,12	0,05	0,00	0,07	0,06	0,19	0,40	0,21
16–17	0,09	0,18	0,09	0,00	0,10	0,11	0,19	0,40	0,21
18–19	0,05	0,18	0,13	0,16	0,19	0,03	0,26	0,39	0,13
	HU			IE			IS		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	0,04	0,03	−0,01	−0,04	0,08	0,12	0,02	0,03	0,02
06–07	0,03	0,11	0,08	0,03	0,24	0,21	0,08	0,09	0,01
08–09	0,02	0,07	0,05	−0,05	0,12	0,16	−0,07	−0,03	0,04
10–11	0,05	0,08	0,03	0,10	0,18	0,08	−0,01	0,03	0,04
12–13	0,08	0,14	0,05	0,06	0,16	0,10	−0,10	−0,06	0,04
14–15	0,07	0,16	0,09	−0,02	0,03	0,05	0,01	0,08	0,06
16–17	0,03	0,12	0,09	0,09	0,15	0,06	0,08	0,08	0,00
18–19	0,09	0,25	0,16	0,12	0,27	0,15	0,16	0,20	0,04
	IT			LU			LV		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	0,08	0,13	0,05	0,08	0,19	0,11	0,09	0,15	0,06
06–07	0,05	0,16	0,11	0,03	0,21	0,18	0,00	0,17	0,16
08–09	0,05	0,10	0,05	0,09	0,22	0,13	0,03	0,06	0,03
10–11	0,08	0,18	0,10	0,02	0,27	0,24	0,11	0,10	−0,01
12–13	0,11	0,17	0,06	0,08	0,28	0,20	0,10	0,13	0,02

(continued)

Table B1. *Continued*

	IT			LU			LV		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
14–15	0,09	0,18	0,09	−0,02	0,04	0,07	0,06	0,09	0,04
16–17	0,07	0,22	0,15	−0,16	−0,07	0,09	0,09	0,10	0,01
18–19	0,02	0,18	0,17	0,03	0,17	0,13	0,05	0,11	0,06
	NL			NO			PT		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	0,19	0,41	0,22	0,16	0,24	0,08	0,20	0,13	−0,07
06–07	0,06	0,30	0,25	0,04	0,16	0,12	0,13	0,11	−0,02
08–09	0,15	0,35	0,20	0,01	0,06	0,05	0,18	0,09	−0,09
10–11	0,04	0,30	0,26	0,06	0,11	0,06	0,13	0,08	−0,06
12–13	0,14	0,37	0,23	0,11	0,09	−0,02	−0,01	0,10	0,11
14–15	0,08	0,28	0,20	−0,01	0,04	0,05	0,10	0,23	0,13
16–17	0,16	0,34	0,18	0,13	0,14	0,01	0,07	0,17	0,10
18–19	0,24	0,35	0,12	0,12	0,08	−0,04	0,05	0,19	0,14
	SE			SI			UK		
	low × med	low × high	med × high	low × med	low × high	med × high	low × med	low × high	med × high
04–05	0,07	0,04	−0,04	0,11	0,13	0,02	0,14	0,21	0,07
06–07	−0,01	−0,01	0,00	0,07	0,16	0,09	0,12	0,23	0,11
08–09	0,11	0,09	−0,02	0,10	0,15	0,05	0,18	0,27	0,09
10–11	0,10	0,02	−0,08	0,01	0,05	0,04	0,19	0,26	0,07
12–13	0,09	0,05	−0,04	0,22	0,23	0,01	0,11	0,22	0,11
14–15	0,01	−0,03	−0,05	0,14	0,13	−0,01	0,10	0,18	0,08
16–17	0,02	0,01	−0,02	0,32	0,33	0,01	0,05	0,16	0,11
18–19	0,10	0,12	0,02	0,21	0,28	0,07	0,08	0,19	0,11

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