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Effects of early childhood education on school achievement and inequality in Spain: the value of early childhood education

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Introduction

The term early childhood education and care, hereinafter the "ECC", refers to public and private early childhood education services aimed primarily at working parents (Moss 2014; European Commission 2013). Family policies of early childhood education are framed within the context of the related policies in that they merge two key functions by providing both care and education at a vital stage in the child's life, namely from the ages of 0–3 years old, with major variations being in evidence depending on the institutional context. Recent research has shown that the early years of a person's life prove crucial for the cognitive development of numerous social skills and abilities (Barnett and Camilli 2002; Burger 2010; Datta et al. 2010; Apps et al. 2012). Only recently the socioeconomic, cultural and educational importance of pre-school learning has been shown through the works of Heckman and Masterov (2007), Heckman (2006) and Esping Andersen (2002; 2008). These authors claim that pre-school education prior to the age of three is vital vis-à-vis ensuring children's future educational attainment and offsetting any potential inequalities that may emerge as a result of family socioeconomic and cultural conditions. Indeed, research has evidenced how factors such as investment in pre-school education are key to reducing child poverty and to securing children's well-being in a context of ever-shifting family change (Heckman 2011; Conti, Heckman 2012; Esping-Andersen 2002; Flaquer 2014). In this regard, Haverman and Wolf (1995) reported that child poverty is reduced when children are provided with quality education in the first few years of their life.

The analytical issues which emerge from these studies are key to conceptualising pre-school education and gauging the actual benefits to be gained from investing in this kind of educational service for children in particular and for

society as a whole. The notion of pre-school education was used in the comparative study of family policy and gender equality in welfare states in Europe (Daly, Lewis 2000; Engster, Stensöta 2011). Yet, in analytical terms, the educational benefits to be gained from investing in pre-school education for both the children themselves and for society have received less attention from scholars, and when they have been the subject of inquiry the findings have proved ambiguous. Certain researchers have concluded that early pre-school education is linked to behavioural problems during adolescence, whereas other studies have reported no such negative effects (Baker 2011; Clarke-Stewart, Allhusen, 2005; Waldfogel 2006). Numerous international studies have highlighted that quality pre-school education can contribute positively towards cognitive development and enhanced educational attainment in later stages of education, primarily among financially disadvantaged children who live in low-income families (Belsky et al., 2007; Brooks-Gunn 2003; Campbell et al. 2002; OECD 2006; Schewinhasrt et al. 2005; Waldfogel 2006). Specifically, the analyses to emerge from PISA data underscore the fact that children who have benefitted from at least one year of pre-school education tend to score better in reading at the age of 15 than those who have not (OECD 2007). In contrast, other studies conclude that the educational benefits linked to early schooling tend to become blurred in the second or third year of formal schooling, particularly among children brought up in a nurtured educational environment (Barnett, Camilli 2002; Blau 1999; Magnuson et al. 2007; McKey et al. 1985). According to the comparative study by Engster and Stensöta (2011) on child welfare, investing in family policies which foster quality pre-school education is an effective tool for enhancing both adolescents' educational attainment and their welfare.

Also prominent are the studies which have empirically shown the short and medium term benefits to be gained from attending pre-school, particularly with regard to cognitive abilities, such as acquiring language skills and short-term academic performance (Barnett 2008). Bassok (2010) showed for the United States that children under the age of four who receive pre-school education achieve significantly better results in literacy tests than children taken care of by their parents. In a similar line of research, the studies conducted by Scheweinhart et al. (1993), Heckman et al. (2010) on the well-known *Perry Pre-school Project*, reported the positive effects on educational attainment and cognitive skills of attending infant school and on children's health and well-being (Currie 2001). Indeed, researchers such as Bauchmüller et al. (2010), Bauchmüller (2013), Kundsen et al. (2006) and Cunha et al. (2006) highlight that cognitive skills related to learning develop in the early years of life in relation to the environment in which the child grows up; hence the importance of attending pre-school, particularly for disadvantaged children. Furthermore, the conclusions to emerge from these studies evidence the link between the quality of the facilities provided by these pre-schools and the cognitive benefits for those children under four years of age who attend them (Hansen, Hawkes 2009; NICHD 2009).

It should also be mentioned that there is substantial empirical evidence to reflect the existence of differing educational practices among parents depending on the socio-economic status of the family (Ermish 2008; West et al. 2000; Feinstein 2003; Becker 2013; Mistry et al. 2008). Based on these findings, the beneficial effects of pre-school education among lower-class children have been shown, mainly due to the fact that the stimuli to which they are exposed at these centres resemble those received by the children of well-off families who are cared for in their own environment. These findings have been reported for the United States (Mc-Cartney et al. 2007; Bassok 2010), the United Kingdom (Becker 2011) and Germany (Felfe, Lalive 2012; Schober, Piess 2013), although other studies suggest that the beneficial effect of pre-school education is distributed evenly for children with a different socioeconomic status (Peisner-Feinberg et al. 2001; Vandell et al. 2010). Although these studies fail to prove conclusive given the different approaches used to measure socioeconomic condition (in some cases the parents' education is considered whilst in others it is the family income), they do seem to provide clear evidence in the sense that attending pre-school before the age of four does to a certain extent make up for social and educational imbalances resulting from family contexts in which there are limited socio-economic resources that can be devoted to fostering and stimulating the cognitive and personal development of these children throughout their life cycle (Gormley et al. 2005; Melhuish 2003).

Concurring with this line of argument, many researchers have provided empirical evidence that the quality of pre-school education can offer major benefits for children from less-favoured family and socioeconomic contexts and that pre-school education can become a valuable instrument in fighting social inequality (Knudsen et al. 2006; Esping Andersen et al. 2011). Attending pre-school educational centres therefore proves to be an effective mechanism for combating the educational inequality that stems from family circumstances (Bradbury et al. 2011; Dearing et al. 2009; Hansen, Hawkes 2009). For instance, Geoffroy et al. (2010), showed that whereas children whose mothers have a low education level display fewer cognitive skills at the age of six than those whose mothers have a high level of education, said premise fails to hold for children whose parents have low levels of education when the children attend pre-school.

The benefits to be gained are not only individual but also social. In this context, it is also worth highlighting the positive benefits for the public authorities of investing in pre-school education. There is significant literature in the United States reporting the importance of investing in quality pre-school education (Bauchmuller et al. 2010; Karoly, Bigelow 2005; Waldfogel et al. 2011). According to the calculations made by Heckman (2011), each dollar invested in high quality pre-school education generates an annual return of between 7% and 10% on the amount invested.

Although there is widespread consensus in Spain concerning the benefits of education throughout the life-cycle or so-called lifelong learning, there is less agreement with regard to the benefits of early education as a form of human capital due

to the important role played by the family as a key actor in the socialisation process and care of children during the early years of their lives (Cebolla 2014). This accounts for the fact that in Spain few studies have explored the possible link between quality pre-school education and subsequent educational attainment throughout life. Broadly speaking, Spain is a country which offers limited services when it comes to providing pre-school education facilities (Miguélez, Recio 2010; Ibánez, León 2014; Moos 2014). According to Ibáñez and León (2014), the Spanish notion of pre-school education is characterised by its family-based welfare model in which the family plays a key role in looking after children informally through relatives during the early years of a child's life. This system of "informal family-based care" (Saraceno 1994; Moreno Mínguez 2010) has been grounded on a limited development of pre-school education on the part of the public authorities, where the provision and quality of such services is limited and is more welfare oriented (González 2003). In the specific case of Spain, prominent are the works of Gutiérrez-Domènech and Adsera (2012) and Cebolla et al. (2014), who highlight the positive effects on educational attainment of attending formal education at an early age, although they fail to provide empirical evidence on the beneficial effects of how investing in this type of policy can reduce educational inequality.

From the legislative standpoint, the Act on the General Organisation of the Education System [LOGSE], approved in 1990, constituted the first step towards recognising pre-school education in Spain as part of the educational system, establishing two cycles of infant education: from 4 months old to 3 years old and from 3 to 6 years old. According to Rubio (2002), this educational reform heralded the introduction of a certain minimum in terms of quality and public responsibility in the organisation of nursery school facilities. However, the regional decentralisation of powers in the matter coupled with the lack of sufficient funding hindered the implementation of said regulations (González 2004). The subsequent Act on the Quality of Education [LOCE] (10/2002, 23 December) brought an end to the single model of infant education from 0 to 6 years old. This new law was grounded on creating a cycle of voluntary pre-school education up to the age of three, and was welfare-based in nature, although there was limited public availability, with most services rendered only by private entities. The other educational cycle was also voluntary, but public and free, and addressed to children aged from 3 to 6 years. This law did not last long, as in 2004 the new government repealed the LOCE and approved a new act on education which partly re-kindled the spirit of the 1990 LOGSE Act by re-introducing pre-school education from 0 to 3 years old. For this purpose, the amount of 100 million Euros was invested over the period 2008–2012 through the Educa3 Plan. The plan basically consisted of strengthening the educational and not merely welfare-based nature of such services, training professionals and opening new publicly-run nurseries and schools. The cutbacks enforced as a result of the economic crisis in 2008 and the change of government in 2011 led to the Educa3 Programme being scrapped in 2012 and to the privatisation of many of these services (Ibáñez, León 2014).

Objectives and methodology

Objectives

Based on this theoretical approach, the principal objective of the present analysis is to conduct a comparative study of the shifting development of family child education policies linked to pre-school education and to gauge how these policies impact on educational attainment and on reducing educational inequalities in Spain in comparative terms. In this regard, we present empirical evidence based on an exploratory analysis of the data available from various statistical sources. This is an innovative contribution in Spain since, previously analyses of family pre-school education policies focused on gender equality and changes in family structure, however apart from one or two exceptions, (Cebolla et al. 2014), they lacked the element of exploring their possible link to educational inequality and educational attainment in such a detailed and comparative manner. Bearing in mind the above-mentioned theoretical considerations and adopting a comparative European perspective, our research seeks to provide an answer to the question of whether pre-school education positively impacts educational attainment and whether it helps to reduce the educational inequalities that emerge from the socioeconomic and family contexts in which children live. Based on this general question, our research pursues the following goals:

- To examine the link between access to pre-school education and educational attainment in the various countries analysed.
- To explore different uses of pre-school education depending on the socioeconomic situation of the family in different European countries and to gauge the extent to which pre-school education helps to reduce imbalances in the academic performance of families that are disadvantaged in terms of socioeconomics and culture.

Instruments

The approach used in the present analysis is based on gathering secondary data from a range of different statistical sources in order to pinpoint possible educational and social benefits of investing in pre-school education. The method draws on data available from a variety of disperse statistical sources which are not always comparable. The advantage of this measuring technique is that it enables diverse data sources to be brought together, standardised and provided with a comparable format. In addition, this approach highlights the importance of the validity and reliability of the data provided, since they have previously been validated at the primary sources (Sellitz et al. 1980). This instrument also facilitates comparative analysis and allows for the deductive formulation of several questions related to the research topic (Mayntz et al. 2004). The technique merges statistical data from a range of different

sources that contain both individual and aggregate data. We selected data for Germany, Denmark, France, Spain, Italy and the United Kingdom, since each of these countries represents an example of one kind of welfare state but display a different approach in terms of pre-school education policies. Denmark is included in the so-called "social-democratic" model of welfare in which the provision of educational and care services is universal, free and of high quality. It also fosters work-life balance. Germany is an example of the so-called "corporative" system in which care and pre-school education are conceived by the State as a basic family function, encouraging the involvement of the mother in the care and socialisation of the young. Spain and Italy represent the "Mediterranean" style welfare model which is family-oriented, and where investment in services and facilities of this kind is minimal and welfare-oriented (Ferrera 1996). The United Kingdom is included in the so-called "liberal" model in which pre-school education is market-oriented and there is very little State intervention in supporting such educational services (Esping Andersen 2002; Martín et al. 2013).

The following indicators were chosen to perform the comparative analysis:

1. **Indicators of access to pre-school education**
   - Use of pre-school education for children aged from 0 to 2 years old.
   - Difficulties faced by parents in terms of using pre-school education (cost, quality and availability).
   - Use of pre-school education for adolescents aged 15 in disadvantaged families.
2. **Indicators related to family and educational policies of pre-school education**
   - Duration of parental leave (maternal and paternal)
   - Public spending on pre-school education
   - Cost of pre-school education
3. **Indicators related to educational attainment depending on use of pre-school education and family situation**
   - Average reading performance results of children in primary school in terms of the number of years in pre-school education.
   - Educational attainment in mathematics of 12 year-old children who attended pre-school education for more than one year.
   - Average reading performance results of children in primary school in terms of the number of years they attended pre-school education and the level of education of their parents.

The comparative description of these indicators will allow us to provide previously unexplored results for Spain regarding a possible link between applying policies that foster pre-school education, access to pre-school education, changes in the family, educational attainment and educational inequality. The first three groups of indicators, which are of an exploratory descriptive nature, concern contextual variables related to differing access to these educational facilities and services, family situation and educational attainment policy, and difficulties involved in accessing this type of education in these different countries. The latter group of indicators

provide an explanatory analysis of the link among access to pre-school education, educational attainment and social inequality; in this case, educational attainment is a dependent variable and the independent variables represent access to pre-school education and result from a disadvantaged family situation. Applying this innovative approach to the case of Spain allows us to gain deeper insights into the effect which pre-school education has on academic performance and life-long personal development.

A variety of statistical sources has been used to achieve these objectives and to seek an answer to the above-mentioned empirical goals. The indicators and variables were drawn up based on data provided by the EU-SILC (Eurostat), European Labour Survey (Eurostat), PISA Database (OECD), PIRLS Database, IEA; UOE and National Accounts, OECD Tax Benefit model, UNECE, International Network on Leave Policies and European and EUROFOUND (European Quality of Life Survey).

Analysis of the results

Table 1 sums up some of the indicators which exemplify differences between public pre-school education policies in the various countries analysed. The first finding that is worth highlighting is that investment in this type of educational facilities does not exceed 1% in all the countries considered, with the exception of the Nordic countries. The case of Denmark and Sweden, where the percentage is slightly above 1% of their gross domestic product and where investment has increased most since 2006 (see graph I) is prominent in this regard. Spain occupies an intermediate position, and the effort made by the public authorities to boost this kind of facilities since 2006 can be seen, even though the 2007 figure still failed to exceed 0.7% of the GDP (see graph 1). The United Kingdom and Portugal are the countries which invest least in this type of education, among other reasons due to the neoliberal focus of the British welfare state model and the purely care-oriented nature of these services in Portugal (Tavora 2012). The cost of these services to families in the various welfare systems, with regards to this factor, is worth emphasising. The greatest cost, measured as a percentage of a family's salary in which there are two low-income earners, has been observed in the United Kingdom, where it reaches 27.7%. Germany is the next country. The lowest cost has been noted in Portugal (4.7%) and in Sweden (6.7%). The cost in Spain is around 8.2% of the salary. These figures, however, should also include the amount of fiscal liabilities which are payable in relation to these services, and as a result, their cost is even higher hence for many families informal child care provided by their relatives might prove more cost-effective (European Commission 2013). Although the cost seems lower in Spain, it should be stressed that there is very little public availability of such services in Spain, whereas in Denmark and Sweden

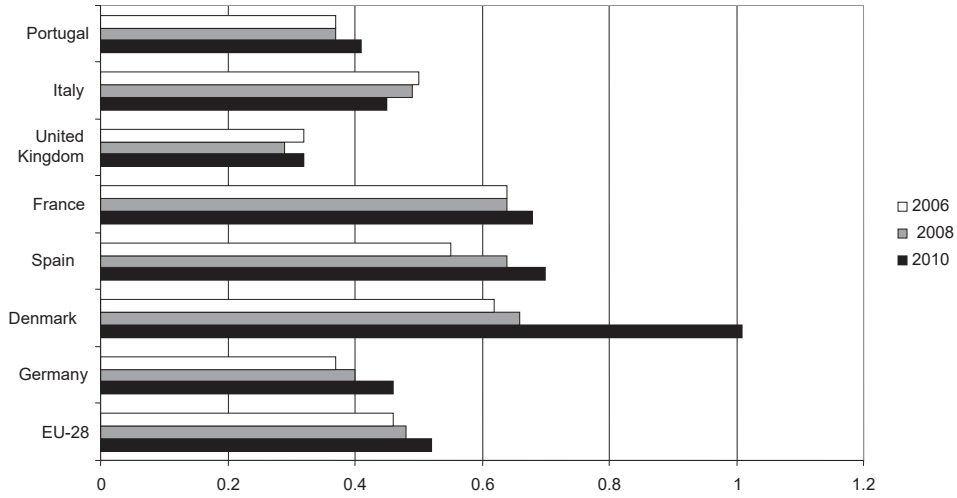
they are provided virtually free of charge to all citizens and paid for with public tax revenues. The lack of pre-school education services in Spain has been a permanent characteristic since the transition to democracy. In fact, a care-based system and poor availability of public nurseries and infant schools has been a predominant theme (Meil, Rogero 2014; González 2004).

The relevance of parental leave should not be underestimated when making any interpretation. It is due to the fact that, depending on options available to families in terms of obtaining paid leave, parents will use the pre-school education services to a greater or smaller extent. The highest number of paid months of parental leave, allowing parents to look after their children, is available in Denmark (12 months), Sweden (18.6 months) and Germany (17.21 months). In Spain this time covers the period of 4 months and 19 days, which resembles the situation in Italy (4 months and 65 days). In the United Kingdom it covers only 1 month and 4 days (see table I). Research carried out in this context underscores the impact of the duration of parental leave on parental involvement (Flaquer, Escobedo 2014). However, less attention has been focused on exploring the link between educational attainment and reducing educational inequality. In the case of Spain, the literature seem to suggest that when parents have low levels of education, they more seldom use parental leave, and their involvement is smaller and of a poorer quality in comparison to parents who have completed secondary and tertiary education (Flaquer et al. 2015). These results fail to provide any conclusions in terms of the use of parental leave in relation to children's educational attainment and reduction in educational inequalities.

Table 1. Table which sums up family policies of pre-school education 2015

Country	Public spending on pre-school education % GDP	Duration of fully or partially paid paternity or maternity leave (duration in moths and days)	Cost of pre-school education (% average salary)	Effective mean taxes (% average salary)
Germany	0.5	17.21	14.2	70.6
Denmark	2.0	12.09	11.2	69.3
Spain	0.6	4.19	8.2	25.7
France	1.2	4.19	9.9	48.6
Italy	0.6	4.65		
United Kingdom	0.3	1.4	27.7	85.4
Portugal	0.4	6.98	4.7	37.4
Sweden	1.6	18.6	6.7	34.6

Source: Authors' own findings based on Eurostat, UOE and National Accounts.



Graph 1. Public social spending on pre-school education as a % of GDP, 2006–2010
Source: Authors' own findings based on Eurostat, UOE and National Accounts.

These data concur with the difficulties expressed by parents with regard to accessing pre-school education (see Table 2). In Spain, Italy Portugal and the United Kingdom, the financial cost is the key difficulty (67%, 63%, 63% and 78%, respectively). The poor public availability of such services poses a major hurdle in the United Kingdom, Portugal, Spain and Italy, whereas in Sweden it was reported only by 28% of the respondents. The respondents also highlighted the problem of poor quality of the service. This obstacle was declared by 30% of Spanish respondents, 25% of British and German, and by 36% of Portuguese, whereas only 18% of Swedes declared it. These findings underline the fact that it is not only the cost of public pre-school education services which determines the use thereof but also their availability and quality. Another key barrier is, the high financial cost of these services, which is at comparable level in the southern European countries, where public offer is extremely limited and where families are forced to shoulder the burden of having to pay for private pre-school education services. By contrast, in northern European countries, the public offer and quality of such services is guaranteed for those families which decide to use this service. Facilities are limited in southern European countries and the quality thereof is not subject to any strict control (Esping Andersen et al. 2011; Knijn, Oorschot 2008; Cebolla 2014).

As reported in numerous studies, differential access to these educational facilities also results inthe contrasting differences in children's educational attainment and with regard to reducing inequality, in the United States in particular (Bassok 2010; Burger 2010; Heckman 2006; 2011; Waldfogel, Washbrook 2011; West et al. 2000). Table 3 shows, retrospectively, the differences in access to pre-school education facilities among 15 year-olds in terms of the socio-cultural features of their families of origin. A look at the first indicator, which sums up the combination

of disadvantages, reveals that disparities in 15 year-olds' access to pre-school education differ by 12% between those who are disadvantaged and those who are not, in favour of children from families which are better off in socioeconomic indicators, as an average of the EU 28. In terms of countries, it can be seen that the difference in access between families with lower and higher levels of education is 3.5% in Germany, 6.4% in Sweden and 5% in Spain. The country to evidence the greatest difference in terms of level of education with regard to access to educational facilities is Portugal (16.6%), with France evidencing the lowest (2.1%). Furthermore, the children of immigrants are less likely to have access to such pre-school education facilities, with the greatest disparities being in Spain (22.8%) and in Italy (27.9%) and the lowest in France (11.3%) and Portugal (14.1%). These data highlight the fact that children from disadvantaged families are those least likely to have access to pre-school education, despite being the group who could benefit most from such facilities vis-à-vis reducing the social and educational inequality brought about by family origin, a fact underlined in numerous reports and sociological studies (European Commission 2013; Burger 2010; Berlinski et al. 2009; Heckman 2011; Melhuish 2003).

Table 2. Key issues in terms of accessing pre-school education (% of parents), 2011

Country	Availability	Cost	Accessibility	Quality of the service
Germany	61	50	39	25
Denmark	37	43	32	20
Spain	53	67	44	30
France	72	60	50	25
Italy	58	63	37	32
United Kingdom	54	78	39	25
Portugal	53	63	42	36

Source: Authors' own findings based on the European Quality of Life Survey, Eurofound (Self-declared obstacles).

The data analysed previously need to be contrasted with the data that evidence the beneficial effects for educational attainment of attending early pre-school education. The data provided by PIRLS 2011 indicate that pupils who have spent longer periods in these child educational facilities are better prepared and score higher in primary education. As can be seen from Table 4, in all the countries selected for the study, children who have spent over three years in pre-school education obtain higher scores in reading in primary school than those who have spent less than one year. The differences observed between countries may be due to many factors which could include the differing public availability or quality of the facilities.

Table 3. Differences in pre-school education attendance rates for 15 year-olds from disadvantaged family environments, 2012

Combined disadvantages									
	EU-28	**Germany**	**Denmark**	**Spain**	**France**	**United Kingdom**	**Italy**	**Portugal**	**Sweden**
SPD	–11.9	–8.8	–8.6	–7.9	–6.1	–11.6	–4.8	–16.6	–12.9
SE	0.53	1.7	1.34	1.02	1.14	2.08	0.76	1.92	1.74
Parents with no tertiary education									
	EU-28	**Germany**	**Denmark**	**Spain**	**France**	**United Kingdom**	**Italy**	**Portugal**	**Sweden**
SPD	–7	–3.5	–6.4	–4.9	–2.1	–5.7	3	–16.6	–7.8
SE	0.4	1.33	1.27	0.83	0.9	1.44	0.61	1.92	1.8
Immigrant families									
	EU-28	**Germany**	**Denmark**	**Spain**	**France**	**United Kingdom**	**Italy**	**Portugal**	**Sweden**
SPD	–12.4	–16.3	–18.8	–22.8	–11.3	–17.9	–27.9	–14.1	–18.9
SE	0.77	2.24	1.73	1.91	1.74	2.42	1.59	3.39	2.23

Explanatory notes: SPD – score point difference significant; SE – standard error. Comparisons are based on statistical significance tests of p> .0.5. These mean that the likelihood of making a false statement is less than 5%. Cells with less than 50 pupils (unweighted data) have been allocated as missing.

Source: Authors' own findings based on OECD and PISA.

As reflected in the revision of the theory, it is well known that in the United States access to pre-school education for economically and socially disadvantaged children yields major benefits vis-à-vis offsetting educational disparity in primary education (Melhuish 2013; OECD 2014; Heckman 2011). The data provided in the present analysis, taken from PIRLS, support this notion for the European countries chosen for the study. The data in graph II show that the beneficial impact of access to pre-school education on reading performance is greater for children from families with low levels of education than families with high levels of education. On average, in the EU 28, the reading advantage for children who attend pre-school education for over one year and who are from families with a low level of education is 18 points higher than for children of the same level who attended less than one year. The impact on the children of families with a high level of education is 9 points (Eurydice 2014). In the case of Spain, the positive effect of attending pre-school education in children from families with a low level of education is 15 points in reading performance compared to children from the same socioeconomic status who do not attend or who attend for less than one year. For

Spain, these data support the notion of how important it is to have access to pre-school education in the fight against educational inequalities. Similar studies have been conducted by Hidalgo and García (2013) into the impact of children attending pre-school education on reading scores and mathematics in primary school based on individual data from the PIRLS-TIMSS Survey (2011). These results for Spain thus evidence the extremely positive effects on educational attainment, mainly on the scores obtained in reading ability in primary school for children whose parents had no university education but whose children had attended pre-school for at least three years.

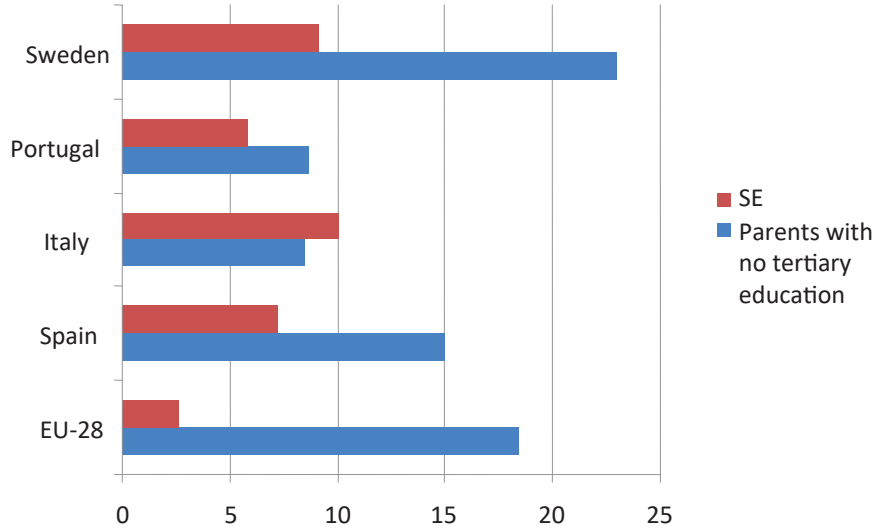
Table 4. Mean score in reading depending on the duration of pre-schooling for fourth-year primary school pupils, 2011

Country	<=1 year / EE	1 to 3 years/ EE	> three years/ EE
EU-28	511 / 2.03	525 / 1.04	548 / 2.44
Germany	508 / 7.57	540 / 2.97	523 / 3.88
Denmark	522 / 8.21	544 / 3.05	549 / 2.52
Spain	493 / 5.72	505 / 3.01	522 / 2.47
France	516 / 20.31	514 / 3.43	524 / 2.82
Italy	527 / 8.73	530 / 3.13	549 / 2.24
United Kingdom	*	*	*
Portugal	527 / 4.69	544 / 3.10	549 / 5.52
Sweden	518 / 7.40	536 / 2.98	551 / 2.35

Explanatory note: PIRLS used the central point of the scale (500) as a reference point which it maintains constant from evaluation to evaluation. Cells with less than 50 pupils (unweighted data) have been allocated as missing. The United Kingdom does not offer data on pre-school education. SE – standard error.
Source: IEA, PIRLS 2011 Database.

The data also reflect the educational benefits of attending pre-school education through the scores obtained by 15 year-old pupils in mathematics (see Table V). The results displayed in the following table point to a significant link between having attended pre-school education for over one year and the performance in mathematics, according to the data provided by PISA (2012). These data show that for all countries, but particularly Germany and France, attending infant schools for at least one year has a major positive impact on the mathematical competence of 15 year-olds when compared to others who did not attend such schools. In the case of Spain, it can be seen that the difference in mathematics scores between those who attended such schools and those who did not is significant (45.5 points) and is above the European average (35.3). Data also reveal that the link between the scores obtained in mathematics and access to this kind of education rose from 2003 to 2012 as a result of increased schooling rates for children under three years of age (OECD 2013). The main methodological problem involved in these data in the case of Spain is that there

might be a bias in the access to such schools in favour of children from families who enjoy a higher socio-economic position, which might add to educational inequalities should governments and local authorities fail to invest in order to foster universal accessibility for all children to educational programmes of this kind (OECD 2014).



Graph 2. Mean score in reading of fourth-year primary school pupils who attended pre-school education for more than one year depending on parents' level of education, 2011
Note: SE – standard error.
Source: Authors' own findings based on IEA, PIRLS 2011, database.

Table 5. Mean score point difference in mathematics associated with attending ECEC for more than one year, 15-year-olds, 2003–2012

2012									
	EU-28	**Germany**	**Denmark**	**Spain**	**France**	**United Kingdom**	**Italy**	**Portugal**	**Sweden**
SPD	35.3	62.5	43.5	45.5	73.3	35.6	46.3	41	
SE	1.33	4.75	2.97	2.78	5.61	4.31	2.95	3.91	
Period 2003–2012									
	EU-28	**Germany**	**Denmark**	**Spain**	**France**	**United Kingdom**	**Italy**	**Portugal**	**Sweden**
SPD		–12	4.9	30.6	4.7	*	40.8	19.7	7.3
SE		13.8	16	7.8	17.2	*	11.3	5.9	8.6

Explanatory notes: SPD – score point difference significant; SE– standard error.
Source: Authors' own findings based on OECD, PISA, 2012, database.

Conclusions

The results presented in this paper seem to suggest that access to pre-school education to children aged from 0 to 3 has a positive impact on educational attainment in Spain, and helps to reduce the educational inequalities that stem from socio-economically disadvantaged family contexts. In addition, the findings indicate that access to pre-school education differs depending on the family's socio-cultural status, although to a different degree depending on the country in question. Spain stands in an intermediate position in this ranking although it is children whose parents have a lower level of education who, in comparative terms, have less access to pre-school education. Northern European countries evidence the highest percentage of children from disadvantaged families who are able to access public pre-school education. In this regard, and in line with international literature, data show that children in Spain who have spent longer periods in this kind of education obtain higher scores in reading comprehension and mathematics, thus reflecting the beneficial effects of such schooling.

Finally, the findings obtained suggest that pre-school education in Spain has an extremely beneficial effect for economically and socially disadvantaged children, and that it is therefore an effective tool for reducing the educational inequalities brought about by family origin. Specifically, the difference in Spain is 15 points in educational attainment (reading comprehension) of disadvantaged children who have attended pre-school education compared to children of the same socioeconomic and family status who have enjoyed access to this kind of infant education. In sum, the results presented in this study would seem to underscore the importance of infant education policies vis-à-vis reducing the educational inequalities of children and teenagers throughout their life-cycle, particularly in the case of children from families that are the most vulnerable in economic and cultural terms.

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