



Factors Explaining the Schooling of Children Under 3 Years of Age: Evidence from Spain

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Abstract

This study investigates the reasons behind the decision to send children aged under three to ECEC (Early Childhood Education and Care) and the causes that may explain why some families send their child to ECEC once they reach the age of two while others decide to do so at an earlier age. To answer the first question posed a probit model is used, while to answer the second query a Heckprobit model is estimated to take into account possible selection bias. The data for this study was taken from an unpublished database compiled by the Spanish National Institute for Educational Evaluation, which gathers information from 1.166 children schooled in the Infant Education stage. The results of our estimations show that the decision to enroll children under three in ECEC services depends fundamentally on the sociodemographic characteristics of the mother (educational level, employment situation and age), on household size (if it is a large family) and on the availability of ECEC services in the area in which the child lives. Our study has also shown that the only variable regarding factors that explain the differences in the age of access to ECEC services, two or under two, is the importance that parents place on their children developing empathy towards others. On the basis of our results, the study offers recommendations aimed at the progressive universalization of this initial educational stage.

Keywords Early Childhood Education and Care · Socio-ecological perspective · Selection bias, Heckprobit

Introduction

Quality education in the initial years of infant schooling is, without a doubt, a critical component of the education system as a whole. The fact that learning is acquired through an accumulative hierarchical process (Cunha et al., 2006) gives this learning stage particular importance, as it highlights the fact that the more robust is the learning acquired in the earliest years of life, the fewer the difficulties that will arise in the subsequent process of acquiring new skills and knowledge.

The potential of Early Childhood Education and Care (ECEC) to improve the effectiveness of the educational system is aligned with other benefits, such as: the desire to facilitate the incorporation of women into the labour market; the reconciliation of family and employment; and equity, in the sense that boys and girls from disadvantaged backgrounds find additional advantages in attending early childhood education centres (Felfe & Lalive, 2018; Pilarz, 2018; van Huizen & Plantenga, 2018). These potential benefits of ECEC have led to the inclusion of access to quality early childhood development, care and pre-primary education as the second goal within the fourth AG-ONU Sustainable Development Goal.¹

Given this context, the objective of the study is to identify the reasons behind the schooling of very young children in Spain, in order to better target possible state intervention in support of this very early educational stage. The study exploits data from the database, “Evaluation of Early Childhood Education for Spain”, prepared by the Spanish National Institute for Educational Evaluation (INEE) in 2007. This database constitutes the only evaluation carried

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¹ See: <https://www.globalgoals.org/goals/4-quality-education/>

out in Spain of children schooled in the Infant Education stage. It collates information on 1,166 children aged five to six, their respective families, their guardians and the schools in which they are enrolled at that age. The rich information contained in the INEE database enables us to examine variables concerning the child's family context, as well as other variables directly related to the child, such as gender or the age at which he or she started to walk. It also allows us to assess the aptitudes and beliefs of parents regarding the care of their children, their views on the role of early childhood education, and the importance they give to child learning study habits. This information allows us to address the following two questions:

(a) What factors are behind the parental choice to send children under three to school, principally in child care centres?

(b) Why do some families decide to send their children to school before they are two, while others do so at a later stage?

To perform our study we commence from the socio-ecological model adaptation proposed by Pungello and Kurtz-Costes (1999),² according to which the choice of the type of child care chosen by parents depends on four factors: (1) the characteristics of the child, such as age, gender, special needs, or temperament; (2) the characteristics of the parents, such as their age or level of education; (3) variables of the family context and environment, such as the family's socio-economic level, the occupation of the parents, the family structure, the offer of state child care in the area of residence, or regional family reconciliation policies; and (4) the mother's beliefs and preferences regarding the care of her children.

Based on this proposal, and following a review of international studies on this subject, we can affirm that there is a consensus in the literature stating that the educational level of the mother, her participation in the labour market, and the level of household income are determining factors in the type of child care chosen (Chen & Bradbury, 2020; Suárez, 2013; Sylva et al., 2007). Some studies also highlight the availability of ECEC services in the local area (Archambault et al., 2020; Ünver et al., 2021; Vandebroek & Lazzari, 2014).

Other studies, albeit fewer in number, include in their analysis questions related to the characteristics of the child and the aptitudes and beliefs of the mother. For example, Sylva et al., (2007), using the *Families, Children and Child*

Care study which includes information from a sample of 1201 English children aged 3 and 10 months, specify a logistic regression model to identify, on the one hand, the factors that explain attendance at child care institutions as opposed to maternal care and, on the other hand, the number of hours of attendance at the school. The results obtained show that the factors which most influence the decision to send children to school before their first birthday are sociodemographic (the month of the child's birth). The most relevant factors influencing the number of hours an infant spends in child care centres are the psychological traits of the mother. Indeed, those mothers who view their own employment as having a positive influence on their children's development are more likely to choose child care centres and use them for longer hours. Another study is that by Tang et al., (2012), based on the model of Pungello and Kurtz-Costes (1999) and performed in the United States on a sample of 802 children taken from *The Three-City Study* (a survey addressed to mothers and children in low-income neighbourhoods). These authors maintain that the characteristics of the child, gender, month of birth and temperament, as well as mothers' preferences regarding the care of their children, serve to predict the type of care chosen for the children: Head Start, other care centres (private non-profit and for profit), domestic care or maternal care. Other studies that also include analysis of the preferences and aptitudes of parents regarding the care of their children are those by Kim and Fram (2009); Prusinski et al. (2022); Sibley et al. (2015); Zachrisson et al. (2013).

In this context, the main contributions of our study are to be found in the following themes. On the one hand, this study, apart from identifying the factors that may explain early schooling, also analyzes the reasons which may lie behind the fact that some families decide to send their children to school before the age of two, while others do so once the child has turned two. On the other hand, our estimates take into account the possible selection bias derived from the choice, made by the families themselves, as to whether to send the child to school before the age of 3 (self-selection). For this, a two-stage probit model (Heckprobit) is used. Finally, the novel approach of the research, namely that of taking the child as the sample unit, is totally unprecedented in Spain, given the lack of microdata referring to children of such a young age.

The results of our estimations show that the schooling of children under three is fundamentally due to sociodemographic variables related to the mother and the household. Thus, children of younger mothers with a higher level of education or who are working are more likely to enrol their toddler in ECEC services. Children from large families (three or more children) and who reside in municipalities with a greater provision of ECEC centres are also more likely to be enrolled early. On the other hand, our results show that the only statistically significant variable regarding

² Based on the original model of Bronfenbrenner (1979) and, more specifically, on one of its later extensions (Bronfenbrenner, 1986), Pungello and Kurtz-Cortes proposed a theoretical model capable of explaining how and why working mothers choose the type of care for their children.

factors that explain the differences in the age of access to ECEC services, two or under two, is the importance that parents place on their children developing empathy towards others.

The paper is organized as follows. Following this introduction, “[Background: Early childhood education in Spain](#)” is devoted to an overview of early childhood education in Spain. “[Database and variables](#)” presents the database from INEE (2007). The empirical methodology is explained in the “[Methodology](#)” which is followed by the “[Results](#)”. The paper ends with conclusions and recommendations.

Background: Early Childhood Education in Spain

In Spain, as in most Mediterranean countries, early childhood education is structured in two stages: First Cycle of Early Childhood Education and Care (hereinafter FCECEC), aimed at children up to two, and Second Cycle of Early Childhood Education and Care (SCECEC), which is offered to children aged between three and six. This formal separation into two stages resulted from Organic Law 1/1990, 3 October 1990 (LOGSE), which recognized the need to achieve equal access to the educational system and publicly guarantee the right to a child care place for all children over the age of 3.³

As far as the first cycle is concerned, this law established minimum quality levels, encouraging the Autonomous Communities (regions) to increase the supply of places for a society increasingly demanding these services. These efforts did not, however, have the necessary financial support. Private centres represented more than half of the places offered at the end of the 1990s, while state centres did not guarantee free admission. Despite the cost of these services, the progressive incorporation of women into the labour market favoured their utilization, increasing the enrolment rate for children up to two from 4.0% in the 1992/1993 academic year to 10.1% in 2001/2002.

The next objective was to increase this percentage to 33%, as recognized in the so-called Barcelona objectives, proposed by the European Council to its country members (European Commission, 2014). In this scenario, in 2006 the Organic Education Law (LOE) was approved. Although this law did not recognize a place in the FCECEC as a right, it encouraged the Autonomous Communities to progressively

increase the supply of places, which favoured the enrolment rate among children under two, rising to over 30% from 2010.

After reaching this target, the enrolment rate among under-threes increased progressively over the following ten years, to over 40% in the 2019/2020 school year. It should be noted that, despite the approval of a new education law in 2013, the LOMCE, this legislation did not reformulate early childhood education, and thus its regulation fell upon the individual Autonomous Communities, thereby giving rise to a heterogeneous framework within the Spanish panorama. Consequently, for example, in the school year 2021/2022, in regions such as Andalusia, Galicia, Madrid, the Basque Country or La Rioja, the enrolment rate among under-threes exceeded 50%, while in other Communities such as Asturias, the Balearic Islands, the Canary Islands, Castile and León or Murcia this figure did not exceed 30% (Spanish Statistical Institute).

These differences between regions are mainly due to the differences in the availability of state child care centres and the subsidies that families receive to send their children to school (León et al., 2022). Taking everything into account, and despite the efforts made in recent years to reduce the cost of these services, in comparison with other European countries, Spanish families are among those that spend most on FCECEC, bearing more than 40% of the total cost (25% on average in Europe).⁴

Other questions which we find worthy of emphasis in regard to this educational stage in Spain are those concerning the study plans (curriculums), the training and employment conditions of the personnel responsible for this stage and the daily routines of the centres. In the case of the curriculum, this was scarcely regulated by FCECEC, its supervision falling upon the Communities (Mancebón-Torrubia & Villar-Aldonza, 2020; Vélaz-de-Medrano et al., 2020). In fact, it was not until the publication of Royal Decree RD 95/2022 when the central authorities determined a common curriculum for the entire national territory.

With regard to the requirements demanded from professionals in this stage, the qualification of Teacher or Higher Technician specialized in Infant Education has been required since 2006 (Vélaz-de-Medrano Ureta, Manzano-Soto & Turienzo, 2020). We believe it important to underline that the demand for qualified teachers outstrips career expectations by 50% (Hernandez & Pérez, 2018).

Lastly, and prior to concluding this brief presentation of Infant Education aimed at under-threes in Spain, we shall refer to the routines in the centers, which are largely shaped by the pedagogical principles contained in the relevant legislation. Consequently, each center is obliged to

³ A detailed analysis of the impact that the universalization and pedagogical commitment promoted by the LOGSE had on the second cycle of early childhood education can be found in Felfe et al. (2015). This study shows that one of the benefits is the improvement in reading skills and the reduction of school failure among its participants at the age of 15.

⁴ See Save the Children (2019).

develop its own educational plan on the basis of its pupils' characteristics.

With regard to daily classroom life, this is organized structurally through a series of activities adapted to the age of the youngest children. Some of the most frequent activities are: sensorial activities (animal sound games, musical games etc.), psychomotricity activities (crawling, walking etc.), group activities to encourage socialization and all those pedagogical activities related to everyday skills (eating, hygiene, dressing, picking up their things etc.). Similarly, centers may offer complementary services, among which are prominent school lunches (whose cost must be borne, in the majority of cases, by the families) and the broadening of the timetable (which is also subject to a surcharge for the families, in addition to all those activities and initiatives which, at the level of the center are decided to undertake (as long as they are of an educational nature).

Database and Variables

The database used in this study comes from the Pilot Report "Evaluation of Early Childhood Education for Spain" prepared by the National Institute for Educational Evaluation (INEE) and which constitutes the only evaluation carried out in Spain of children of such a young age.

The process followed in the selection of the sample, detailed in INEE (2007), was that of a random stratified sampling among second-cycle early childhood education centres (a free and universal stage in Spain) of those Autonomous Communities that agreed to participate in the study. In total, 60 centres were selected and, for each, an average of 22 students between 5 and 6 years of age who, in 2004, were enrolled in the third year of the second cycle of early childhood education (the year prior to the start of compulsory schooling in Spain). Once the population relevant to the study was selected, the corresponding questionnaires were distributed to families, centres and tutors, with the response rate of these groups being 1034, 58 and 46, respectively.⁵

The richness of the database enables us to empirically approach the research questions posed at the beginning of this paper from a socio-ecological perspective and, more specifically, from the viewpoint of Pungello and Kurtz-Costes (1999). Table 1 shows the variables of the survey associated with each of the four factors proposed by these authors to explain attendance at early childhood education

centres: characteristics of the child, characteristics of the mother, variables of the family context and the mother's beliefs and preferences regarding the care of her children.

Among the variables presented in Table 1, the variable "age of the child when he/she started school for the first time" deserves special attention. Based on the parents' response to this question, two variables of interest are constructed in our study⁶: First Cycle Early Childhood Education and Care (FCECEC) and First Cycle Early Childhood Education and Care by age (FCECEC by age). These are the dependent variables in our study. The first takes a value of 1 for those children who attended FCECEC before the age of 3 (158 children), or 0 otherwise (598). The second variable of interest, FCECEC by age, restricts the sample to only those children who attended school before the age of three, that is, to 158 individuals. Of these, 73 were enrolled at the age of two (value 1) and 85 were enrolled before the age of two (value 0).

With regard to the independent variables, the original database presented a high percentage of missing values for these (around 30%). Thus, and in order not to lose too much information, we use the EM algorithm of imputation of missing values on the independent variables of the model (Dempster et al., 1977; Pigott, 2001).⁷

Methodology

Discrete Dependent Variable Models

The qualitative and binary nature of the variables to be analyzed—attendance at the First Cycle of Early Childhood Education FCECEC (0:No; 1:Yes) and attendance at the First Cycle distinguishing by age (FCECEC by age)—implies the use of models with a discrete dependent variable (Wooldridge, 2015).

With this series of models, we aim to estimate the probability that $FCECEC = 1$, variable y in Eq. 1, as a function of a series of explanatory variables (x) as follows:

⁵ In addition to this, the database provided information on the scores obtained by the children in various tests in which their skills were evaluated in a number of areas, such as: communication and representation, the physical and social environment and skills in the use of ICTs. The analysis of these questions was performed in a previous study by two of the authors of this current study: Mancebón et al (2018).

⁶ In the construction of these variables and the fact that the start of the academic year in Spain (September) does not coincide with the start of the natural year were taken into account. This led us to correct the assignment of the academic year of students born in the months of October, November and December of 1999. For example, those stating they had begun early education at the age of 2 and were born in the last quarter of the year were classified as attendees of the second cycle, given that in each academic year those children who turn three in the year underway are incorporated into this educational stage.

⁷ The descriptive statistics of the variables following imputation are included in Table 4. The independent variables have been selected taking into account the Pungello and Kurtz-Costes model and the usual statistical exploratory analysis (correlations and non-multicollinearity).

Table 1 Original variables of the Pilot Report on the situation of Early Childhood Education in Spain grouped based on the proposal of Pungello and Kurtz-Costes (1999)

Variables for child

- Gender: (0) Boy (1) Girl
- Month of birth: continuous
- Age when started walking (months): continuous
- Age when started talking (months): continuous
- Age when started school for the first time: continuous
- Maternal language: (1) Spanish; (2) Other language
- Order of birth among siblings: continuous

Characteristics of mother and father

- Educational level of mother: (1) Primary or lower; (2) Secondary; (3) University
- Mother’s year of birth: continuous
- Educational level of father: (1) Primary or lower; (2) Secondary; (3) University
- Father’s year of birth: continuous

Context of family and home

- Employment status of mother: (1) self-employed; (2) employee; (3) unemployed; (4) retired; (5) looks after the home/houseparent; (6) other
- Employment status of father: (1) self-employed; (2) employee; (3) unemployed; (4) retired; (5) houseparent looks after the home; (6) other
- Socioeconomic level: (1) low; (2) medium low; (3) medium high; (4) high
- Household resources: (1) reference books/school support; (2) reading books; (3) children’s books; (4) specialized magazines; (5) daily press; (6) computer; (7) Internet; (8) digital TV; (9) DVD player
- Personal space for the child: (1) has their own room; (2) shares a room with another sibling; (3) shares a room with several siblings; (4) sleeps in the living room; (5) other
- Number of children constituting the family unit: continuous
- Family structure: (1) lives with mother/guardian; (2) lives with parent/guardian
- Responsible for the learning of the child: (1) parent or guardian; (2) mother or guardian; (3) both; (4) other individual
- Responsible for taking/picking up the child to/from school: (1) mother/guardian; (2) parent/guardian; (3) person close to the family environment; (4) salaried person; (5) other individual
- Reason for choosing ECEC: (1) only centre in the local area; (2) lack of places in other desired centres
- Autonomous Community: Andalusia, Aragon, Asturias, Cantabria, Castile and León, Castile-La Mancha, Extremadura, Navarre and La Rioja

Parental aptitudes and beliefs

- Parents’ view of early childhood education: (1) what is most important is that children are well cared for; (2) what is most important is that children are well cared for and learn something; (3) what is most important is the acquisition of learning
- Importance that parents place on their children making good progress in: (1) Oral comprehension/expression; (2) the reading-writing process; (3) math skills; (4) interest in things; (5) motor acquisitions; (6) manual skills; (7) responsibility for their belongings; (8) take into account the feelings of others; (9) communicate appropriately with others; (10) acquire study habits; (11) learn behaviour patterns and collaboration; (12) foreign language learning; (13) computer management
- Educational aspirations: (1) complete ESO; (2) complete Vocational Training; (3) finish high school; (4) obtain a degree; (5) other

$$P(y_i = 1|x) = G(\beta_0 + \beta_1x_{11} + \dots + \beta_kx_{ki}) = G(\beta_0 + x_{ki}\beta_k) \tag{1}$$

where G is a function that assumes values strictly between 0 and 1 for all real numbers. Various non-linear functions have been developed for function G in order to ensure that the probabilities are between 0 and 1: the two most common alternatives are the logit models, which assume a logistic function, and the probit models, which assume a normal function. In our particular case we use probit models.

Once the maximum likelihood probit estimates are made, the β coefficients are obtained, whose magnitudes are not directly interpretable as they are in the general linear model. To facilitate their interpretation, the marginal effects that

provide a good approximation of the change in y produced by a change of 1 unit in x are calculated in the estimates (Hanmer & Ozan-Kalkan, 2013; Williams, 2012).

$$EM_*^k = F(\beta_0\beta_1x_1^* + \dots + \beta_k(c_k + 1) + \dots \beta_kx_k^*) - F(\beta_0 + \beta_1x_1^* + \dots + \beta_k(c_k) + \dots \beta_kx_k^*) \tag{2}$$

Among the different measures derived from the marginal effects, Mood (2010) suggests using the Average Marginal Effect (AME), which allows possible problems associated with unobserved heterogeneity to be corrected; in other words, the variation in the dependent variable produced by omitted variables in the model. The AMEs are interpreted as the average marginal change in the probability of attending

the first cycle of early childhood education, given changes in the value of the explanatory variable (the mother changes from unemployment to employment, for example).

Sample Selection Bias and the Two-Stage Model

Conventional probit models are not appropriate when there is a potential sample selection bias in the study (Heckman, 1979). This problem may be due both to problems associated with the sample design and to the self-selection of individuals, that is, that the individuals comprising the sample have themselves chosen to belong to a certain group.

This is the case in our second variable of interest, FCECEC by age, which by definition only takes values for children whose parents decided to send them to school in the first cycle of ECEC (that is, for those whose value of the variable $FCECEC = 1$). Consequently, the estimates of the model with the dependent variable FCECEC by age only represent a part of the population (158 individuals), giving rise to potentially biased parameter estimates (selection bias).

To address this potential problem, we adopt Heckman's two-step selection strategy (Heckman, 1979). This methodology helps to evaluate the effect of the explanatory variables on the decision to send a child to school before or after he/she turns two, taking into account the self-selection of individuals. Specifically, and given that our variable of interest -FCECEC attendance by age- is a dichotomous variable, a two-stage probit selection model is used. This series of models, also known as "Heckprobit", is an adaptation of the two-stage models proposed by Heckman for a probit equation (Butler, 1996).

The first step is to estimate a probit model which calculates the probability (given the characteristics of the child, the mother, the household, and the parents' skills and beliefs) that a child will attend ECEC before the age of three. With this model, represented in Eq. 3, we obtain the statistic known as the inverse Mills ratio (λ), which captures the magnitude of the bias.

This statistic is later included in the original equation (second step), where attendance at FCECEC is used as a dependent variable. By including the inverse of the Mills ratio as a control variable in the model to be estimated (Eq. 4), the magnitude of the bias is controlled so that subsequent estimates are consistent. The two-stage Heckman model is specified as follows:

$$\Pr(D_j = 1 | Z_j) = \alpha + \gamma Z_j + \varepsilon_j \quad (3)$$

$$\Pr(Y_j = 1 | X_j) = \alpha + \beta X_j + \lambda_j + \mu_j \quad (4)$$

where D_j represents the dichotomous variable FCECEC (a value of 1 for children who were enrolled in school before

the age of three, and 0 otherwise); Z_j is the set of covariates; Y_j is the dichotomous variable FCECEC by age; X_j is the set of explanatory variables and λ_j is the inverse Mills ratio.

Results

Following the methodological specifications indicated in the previous section, two models are estimated that serve to answer the two research questions posed at the beginning of this paper: What factors are behind the schooling of children under three in child care centres? Do these factors vary, depending on the age at which children were enrolled in school, either before the age of two or once they had reached their second birthday?

The results from the estimation of the probit models indicated in the previous section are given in Tables 2 and 3.⁸ The variables concerning the environment, such as the supply of state child care centres or aid for schooling or maternity leave policies, have been taken into account by incorporating a dummy variable for each Spanish region participating in the study.

Drivers of Attendance at FCECEC

As can be seen in Table 2, the factors behind the decision to send children to school before the age of three are mainly related to the characteristics of the mother and the household: the educational level of the mother, her age, her employment status and the number of children in the household, and to the availability of centres in the locality, the latter being extracted from the parents' response as to whether the centre their child attends at the age of 5–6 is the only centre in the local area.

The characteristics of the mother, her level of education or her age, constitute two first-order conditioning factors in the decision to send very young children to school. The fact that mothers have higher education instead of primary education implies a 7.4 percentage point increase in the probability that the child will be enrolled in school before the age of three. Regarding the age of the mother, a negative and significant relationship is observed: at older ages, there is a 1 percentage point probability of sending children to school in the first three years of life.

Concerning family and household characteristics, the employment status of the mother (employed versus unemployed) produces an increase of 8.5 percentage points in the probability of early schooling for the child. Regarding

⁸ The estimations have excluded from the sample the 11 individuals whose parents or tutors responded negatively to the question "Family members in the household: Mother".

Table 2 Probit model to predict attendance at the first cycle of early childhood education (0: no attendance [n = 598]; 1: attendance [n = 158])

	Marginal effects	
	AMEs	Std. Error
Variables for the child		
Gender (girl)	0.019	0.028
Child started walking before age of 1	0.027	0.034
Characteristics of the mother		
Mother with secondary education	0.061	0.037
Mother with further education	0.071*	0.041
Mother's age	- 0.011***	0.003
Family and home context		
Mother's employment status (working)	0.080***	0.031
Socioeconomic level (high)	0.039	0.032
Cultural possessions index	0.003	0.017
Family with two children	0.027	0.038
Family with three or more children	0.111**	0.047
Biparental family	- 0.018	0.050
Responsible for taking the child to school (close family member)	0.018	0.040
Only child care centre in local area	- 0.154***	0.041
Parental aptitudes and beliefs		
Role of child education	- 0.018	0.044
Importance of the child acquiring study habits	0.029	0.036
Importance of the child valuing the feelings of others (empathy)	0.033	0.039
Size of sample	756	
Hosmer-Lemeshow	0.68	
Pseudo R ²	0.09	
Prob > F	0.000	
Percentage of correct predictions	70%	

*Statistical significance at 10%

**Statistical significance at 5%

***Statistical significance at 1%

the positive and significant relationship found between family size (number of children) and early schooling, a logical explanation can be found in the subsidies and facilities offered in Spain to families with over three children (considered to be large families) to send their children to school. In fact, the number of children, together with household income and the employment status of the parents, is a preferred criterion when it comes to obtaining a place in a public early childhood education centre or obtaining a subsidy to finance schooling for the very young. Likewise, the provision and availability of child care centres is also a key aspect in the explanation of participation in ECEC. To gain an idea of the availability and the size of the locality, we include in our model the variable "only centre in the local area", finding a negative and significant effect on the probability of being enrolled in first cycle (-15.4 percentage points for attendance at AMEs).

The goodness of fit or explanatory capacity of the model used to identify the determining factors of attendance at this very first level of education is satisfactory (see the values

of Hosmer and Lemeshow test and Pseudo R² shown at the end of Table 2).

The predictive efficacy of the model, focused on analysing the percentage of well-classified cases, is also good. Observation of the percentage of correct predictions shows that in 70% of the cases the estimated probabilities for each observation correspond to the observed value.

Drivers of Attendance at First Cycle ECEC According to the Age of the Child: Two Years Old or Younger

This section is devoted to answering the second question in our study: Are there differences in the factors explaining the decision to send a child to school before or after the age of two?

To answer these questions, as outlined above, a two-stage probit model, also known as a Heckprobit model, is used. The suitability of this model compared to a standard probit model is justified by the Wald independence test

Table 3 Analysis of the Heckprobit selection model

	Selection model				Outcome model			
	Beta	P values	95% CI		Beta	P values	95% CI	
			Lower	Upper			Lower	Upper
Constant	- 0.09	0.85	- 0.99	0.92	- 1.53**	0.02	- 2.87	- 0.25
Variables for child								
Sex (girl)	0.08	0.47	- 0.13	0.28	0.02	0.87	- 0.278	0.32
Started walking before age of 1	0.11	0.41	- 0.14	0.35	0.16	0.36	- 0.18	0.51
Characteristics of the mother								
Mother with secondary level education	0.25**	0.02	0.03	0.47				
Mother with higher education	0.29**	0.03	0.03	0.56				
Mother's age	- 0.04***	0.00	- 0.06	- 0.02	- 0.02	0.22	- 0.06	0.01
Family and home context								
Mother's employment status (working)	0.33***	0.00	0.13	0.54				
Socioeconomic level (high)	0.14	0.23	- 0.09	0.38	0.12	0.47	- 0.19	0.41
Cultural possessions index	0.01	0.98	- 0.12	0.13	0.14	0.13	- 0.04	0.33
Family with two children	0.11	0.54	- 0.17	0.36	0.12	0.62	- 0.36	0.61
Family with three or more children	0.42**	0.02	0.07	0.77	0.35	0.18	- 0.16	0.86
Biparental family	- 0.09	0.52	- 0.43	0.23	0.28	0.33	- 0.29	0.85
Responsible for taking child to school (close family member)	0.07	0.73	- 0.21	0.33				
Only child care centre in the local area	- 0.58***	0.00	- 0.90	- 0.27	- 0.39	0.16	- 0.93	0.15
Parental aptitudes and beliefs								
Role of child education (formative)	- 0.07	0.66	- 0.40	0.28	- 0.03	0.90	- 0.52	0.46
Importance of child acquiring study habits (high)	0.11	0.41	- 0.16	0.37	- 0.03	0.88	- 0.41	0.35
Importance of child valuing the feelings of others (high)	0.14	0.34	- 0.15	0.43	0.44*	0.08	- 0.03	0.93
Athrho	1.84	0.02						

Dependent variable: attendance at First Cycle ECEC by age: (0: attendance between 0 and 2 [n = 87]; 1: attendance after two [n = 73])

*Statistical significance at 10%

**Statistical significance at 5%

***Statistical significance at 1%

(Wald chi-square 5.73, p-value 0.016) and by the significance of the athrho statistic (p-value: 0.02). Both tests, which collect the correlation between the error terms of the two equations, indicate the presence of selection bias at a very high level of significance.

The coefficients of the first stage are presented on the left side of Table 3 (selection model). As expected, the factors that explain the FCECEC variable are the same as those appearing in Table 2: the mother's level of education, employment status and age, the family and home context (the number of children) and the public provision of local child care centres.

The results of the second stage, which appear in the last three columns of Table 3 (outcome model results), show that the variable which explains the differences between schooling

at the age of two and schooling at a younger age is the importance parents give to their children valuing the feelings of others. Indeed, those parents who attach great importance to their child acquiring empathy are more likely to take their offspring to child care centres once he or she has reached two. One possible explanation for this result is, without a doubt, the recognition by many families of the FCECEC as a socializing vehicle, providing children with a safe space in which to learn to interact with others.

Conclusions

The current study is aimed, on the one hand, at analyzing the causes behind the decision to send under-threes to Early Childhood Education and Care and, on the other, to investigate why some families make use of these services

before the child turns two while others do so when the child has already reached the age of two.

To this end, use has been made of the Pilot Report “Evaluation of Early Childhood Education for Spain” (INEE, 2007), the sole evaluation which has been performed in Spain with children enrolled in the stage of Infant Education. This information has permitted us to undertake our analysis by taking into consideration data relative to the child himself or herself, the mother, the household, the local environment and the preferences and aptitudes of the parents with regard to the care of their children.

Concerning the reasons driving the decision to school very young children in the first cycle of Infant Education, the results of the study show that these are related, as was to be expected, to the mother (her educational level, her age and her employment situation, to the number of household members (large families) and the availability of ECEC services (number of child care centers in the local area). These results are coherent with those obtained in other studies, which find that households with a higher educational level and whose mothers are in employment are more likely to utilize these care services (Chen & Bradbury, 2020; Kim & Fram, 2009; Suárez, 2013), and that the availability and subsidies offered to families play a determining role in using these services (Fan et al., 2022), especially in countries in which the use of these services is not free and places are not guaranteed (Ünver et al., 2021).

Having identified the factors behind the decision to school infants before reaching the age of three, it is productive to investigate further how the drivers of ECEC vary depending on the age at which the child is enrolled in school (before or after turning two). Employing a Heckprobit model, the results show that the differences between these two age groups are due mainly to the aptitudes and beliefs of the parents regarding the education of their children. Indeed, the importance that parents place on their children valuing the feelings of others has proven to be a primary determinant in the decision as to whether to send children to school at the age of two or earlier.

This study has demonstrated, on the one hand, that the availability of these services in the municipality and that the help given to large families (among which are tax deductions, checks, or reduction and even exemption from fees) favor the use of these services, and consequently one of our recommendations would be to increase the number of infant care centers and also to offer incentives similar to those offered to large families to the entire population

and, especially to the least well-off households. A useful guide on how to encourage the use of these services among families with fewest resources and immigrants is to be found in Archambault et. al (2020). Similarly, and controlling for all those variables which influence the decision to school children prior to the age of three, we find that, when the child is aged two, the importance placed by the parents on their offspring valuing the feelings of others is a determining factor in the decision to school the child, thereby recognizing the value played by this stage in the social and affective development of the infant.

These recommendations are especially noteworthy in a country such as Spain, and it is a fact that we find ourselves in the prelude to what will be universal education accessible to all children under three by 2030. This process is already underway and it is the case that, between 2021 and 2023, the intention is to create a total of 65,382 new places, counting on this end to over 650 million euros from the Next Generation European funds for social and economic recovery required by the pandemic in European countries. It should be underlined, on this point, that the pandemic provoked an unprecedented shock to the entire education system and, especially, among the under-threes, whose enrolment fell by 80,000 (17% of the total), in the academic year 2020/2021 (Ministry of Education and Vocational Training). It must be emphasized, on this point, that it was children from the most vulnerable backgrounds in social and economic terms which suffered these effects most sharply (State Academic Council, 2021; Cook et al., 2022). This was due, largely, to the fact that it was these families who had greatest difficulty in making work compatible with caring for their children (Ferreira van Leer et al., 2021) and in accessing the digital platforms and electronic media with which the centers contacted the youngest children (Ford et al., 2021).

In summary, our study joins the chorus of voices clamoring for the universalization and guarantee of access to these services to the entire population. Given this scenario, it will be necessary to join forces among families, the public administration and the professionals employed in this educational stage, and the coming years will be conclusive in the configuration of a stage which has its own significance and nomenclature.

Appendix

See Table 4.

Table 4 Descriptive statistics of the variables to be used in the model after treatment of missing values

Variables	% valid responses	N	Min	Max	Average	Standard deviation
Dependent variables						
FCECEC	89%	763	0	1	0.21	0.41
FCECEC by age	19%	160	0	1	0.45	0.49
Characteristics of child						
Sex (girl)	100%	860	0	1	0.48	0.50
Started walking before age of 1	100%	860	0	1	0.76	0.42
Characteristics of mother						
Education level of mother ^a	100%	860				
Primary or lower	41%	350				
Secondary	33%	285				
University	26%	225				
Mother's age	100%	860	18	47	33.85	5.30
Family and household context						
Mother's employment situation (working)	100%	860	0	1	0.59	0.49
Socioeconomic level (high)	100%	860	0	1	0.49	0.50
Cultural possessions index	100%	860	- 4.48	0.76	0.00	1.00
Number of children in the family ^a	100%	860				
One	20%	171				
Two	61%	526				
Three or more	19%	163				
Biparental family	100%	860	0	1	0.91	0.28
Responsible for taking child to school (close family member)	100%	860	0	1	0.16	0.36
Only one child care centre in the local area	100%	860	0	1	0.23	0.42
Parental attitudes and beliefs						
Role of child education (formative)	100%	860	0	1	0.86	0.34
Importance of acquiring study habits (high)	100%	860	0	1	0.69	0.46
Importance given to feelings of others (high)	100%	860	0	1	0.78	0.42

Imputed variables

^aNote that for categorical variables, instead of their mean and standard deviation, the distribution of frequencies by categories is presented.

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Declarations

Conflict of interest The authors declare no conflict interest.

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