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Can early schooling at age 2 narrow gaps in child development? Evidence from the French ELFE cohort.

Estelle Herbaut^{1*}

Géraldine Farges²

Jean-François Giret²

¹ CNRS, Centre Max Weber, ENS de Lyon, France

² IREDU- Institut de Recherche sur l'Education : Sociologie et Economie de l'Education, Université de Bourgogne, France

*estelle.herbaut@ens-lyon.fr

Abstract

This article assesses the effects of early schooling in France where children can access school-based preschool programmes from age 2. This policy aims to increase school readiness and targets children in disadvantaged areas. We rely on the Elfe cohort survey to estimate its effect on child development outcomes at age 3.5 and its contribution to the reduction of gaps between children. We are able to control for a rich set of potential confounding variables including children's baseline level of skills and parental aspirations for early schooling. Using OLS regressions, we find that early schooling has a positive effect on motor skills, language skills, knowledge of letters and numbers and, to a lesser extent, on social and self-help skills. In contrast, it has no effect on non-verbal reasoning abilities. We also find that disadvantaged children and those with a low level of skills at age 2 benefit more from early schooling. Using logistic regressions, we show that socially disadvantaged children and high-skilled children are more likely to access early schooling. We conclude that early schooling should be more accessible to low-skilled children in order to better contribute to the reduction of child development gaps.

Key words: Early schooling; child development; educational inequalities; preschool.

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1. Introduction

Research in child development has shown that the first years of life are critical for brain development (Shonkoff & Phillips, 2000) and for the emergence of socio-economic inequalities. For example, a recent article estimates that, in three European countries, up to 50-80 per cent of language gaps by parental education at the end of primary school are explained by gaps generated before formal schooling (Passaretta et al., 2022). As differences in early childhood skills strongly contribute to the intergenerational transmission of socioeconomic status (Durham et al., 2007), policies which attempt to reduce differences in children development at a very early age can be central to give all children an equal start.

Early childhood education programmes have long been identified as an efficient policy tool to foster skill development (Heckman & Carneiro, 2003) and equalize initial endowments (Currie, 2001). However, the available evidence initially comes from intensive small-scale interventions and anglophone countries (Kulic et al., 2019). In addition, empirical evidence regarding the role of school-based preschool programmes, rather than centre-based childcare ones, is scarce for children under age 3 as very few countries have implemented this policy at the national level (Heim, 2018). We contribute to the literature by studying the case of France where all children attend a school-based preschool from age three and while some can enter earlier, once they turn two. Early entrance into preschool has been implemented with the objective to increase school readiness and reduce inequalities among children (Circulaire n° 2012-202, 2012).

We estimate the effect of early schooling (between age 2 and 3) on child development measured at an early age, during the first year of universal preschool, at age 3.5. We aim to answer two main questions. First, what is the effect of early schooling participation on child development outcomes at age 3.5 and to what extent does this effect vary by developmental domains? Second, does early schooling contribute to the reduction of gaps in child development at the beginning of the school career? If early schooling has a positive effect on child development, the implementation of this policy could reduce gaps in two ways. First, early schooling could target children from disadvantaged background and/or with the lowest level of development so that they would be more likely to access it. Second, early schooling may benefit more children from disadvantaged background and/or with the lowest level of development, leading to a reduction of gaps in child development. We test these two hypotheses by looking at both the determinants of access to early schooling and the effects of early schooling for different subgroups.

We rely on data from a nationally representative French birth cohort, the *Étude Longitudinale Française depuis l'Enfance* (Elfe). This rich longitudinal dataset allows us to contribute to the literature in two ways. First, we can estimate the effect of early schooling on different skill domains. We are able to distinguish between the effect of early schooling on language skills, motor skills, social and self-help skills, knowledge of letters and numbers and non-verbal reasoning. Second, and contrary to most articles on this topic, we are able to control for parental aspirations regarding early schooling and children's baseline level of development, measured before entrance into preschool. Families who enrol their child in preschool at age 2 may differ significantly from those who enrol their child at age 3, in terms of social origin and aspirations. Children enrolled in early schooling may also be positively selected in terms of development prior to preschool attendance. A naïve estimate of the association between early schooling

participation and later outcomes may thus under- or over- estimate the benefits of early schooling participation. We address this selection bias by controlling for detailed indicators of family background, home environment and, most importantly, for children's baseline skills and parental aspirations regarding early schooling.

2. Literature review

We review studies which estimate the effects of school-based preschool attendance on various cognitive and non-cognitive outcomes and their heterogeneity for different social groups. It should be noted that these studies typically estimate the effect of preschool attendance between age 3 and 5, while we are focusing on preschool attendance between age 2 and 3. For this age range, the existing literature focus almost exclusively on centre-based childcare programmes which are the only type of early education programmes available in many countries. It goes beyond the scope of this article to summarize the rich literature on the effects of childcare programmes (see for example van Huizen & Plantenga, 2018) since French preschools differ significantly from centre-based childcare programmes. Most notably, French preschools are school-based, managed nationally and focus explicitly on the acquisition of language and numeracy skills (see section 3).

2.1 The effects of preschool on children's skills

The literature on preschool attendance has consistently demonstrated a positive effect of preschool attendance on school outcomes and cognitive skills, even when accounting for selection biases by mobilizing a quasi-experimental approach. For example, in England, preschool attendance (around age 5) has a moderate positive effect on test scores at age 11 both in math and language skills (Apps et al., 2013). In France, one additional year of preschool (between age 3 and 4) decreases the risk of grade repetition and increases test scores at age 11 and the probability to graduate from high school (Dumas & Lefranc, 2010). In Argentina, one year of preschool increases language and numeracy skills in third grade (Berlinski et al., 2009) and, in Uruguay, it increases largely the probability to be in school at age 15 (Berlinski et al., 2008). In the U.S., prekindergarten (at age 4) is associated with higher reading and mathematics skills at school entry (Magnuson et al., 2007).

It is unclear whether these results are generalizable to preschool attendance at age 2 as the preschool context may not be fully adapted to very young children and be less favourable or even detrimental to their development (Brisset & Golse, 2006). The qualitative observation of two-year olds in a preschool in France suggests that early schooling's objectives in terms of school competences and behaviours in the classroom can create difficulties for some children who are identified very early as "underperforming pupils" by the teacher (Garnier & Brougère, 2017). Quantitative results on preschool attendance at age 2 are indeed mixed. One study finds a large positive effect of early schooling on numeracy skills in primary and lower secondary school (Filatriau et al., 2013) and another finds a small decrease in grade repetition in primary school (Caille, 2001). Conversely, two studies conclude that early schooling at age 2 do not have a statistically significant effect on test scores at age 11 (Ben Ali, 2012; Heim, 2018). However, none of these studies account for differences in child development before preschool entrance.

Results regarding the effect of preschool attendance on non-cognitive outcomes are more mixed than for cognitive ones. One study finds no effect on non-cognitive outcomes defined as

socialisation and health risky or problematic behaviours measured at age 16 (Apps et al., 2013) while early schooling is found to have a negative effect on non-cognitive outcomes defined as child's behaviour problems measured at age 6-7 in Australia (Suziedelyte & Zhu, 2015) and in the U.S. (Magnuson et al., 2007). In contrast, a slight positive effect is found regarding the sociability of children at age 6 in France (Filatriau et al., 2013) and large positive outcomes are identified on third graders attention, effort, discipline, and class participation in Argentina (Berlinski et al., 2009).

2.2 The equalization effect of preschool attendance

A large cross-comparative study concludes that, in 28 developed countries, preschool attendance benefits more children with less involved or less educated parents (Cebolla-Boado et al., 2017). This correlational finding is confirmed by several quasi-experimental studies (Apps et al., 2013; Becker, 2011; Dumas & Lefranc, 2010; Leuven et al., 2010; Suziedelyte & Zhu, 2015) and also applies to children living in disadvantaged areas (Berlinski et al., 2009). However, this effect may not be systematic. The quality of preschool programmes appears to be crucial (Hall et al., 2009) and a study concludes that preschool attendance reduces ethnic educational inequalities only when immigrant children attend preschool with a beneficial social composition (Biedinger et al., 2008).

The question whether early schooling participates to the reduction of social inequality is not new in the French context. Previous studies find that, in the 80s-90s, disadvantaged students had less access to early schooling though the effect was similar (and beneficial) for all social strata (Jarousse et al., 1992). Other studies found that the effect was larger for both upper class and working class children but null for intermediate social groups (Caille, 2001; Jeantheau & Murat, 1998). Not only has the context of early schooling changed since this period (see below) but none of these studies address the potential selection bias due to differences in child development prior to early schooling.

3. The French context

In France, preschool attendance from age 3 to 6 has been universal for many years¹ and has become compulsory in 2019. Children usually start preschool in September of the year they turn 3 but can be admitted earlier, after their second birthday. There are no formal criteria for being granted access at age 2 but priority is given to three-year-old children so preschool availability is a crucial factor. In addition, children born in the first semester are more likely to enter preschool early because they have already turned two in September. However, children can also access preschool later in the school year (i.e. deferred access).

The preschool sector is administered at the national level and children are overwhelmingly attending public preschools². As of the 2000s, under the influence of international comparative surveys, French preschools were accused of not adequately preparing children for primary education. Since then, French preschools have focused more on formal activities aimed at developing academic skills and have been considered as an actual stage of the school system (Leroy, 2020). The ministry of education establishes a national curriculum which focuses on

¹ Since 1999, around 97% of three-year-old children are enrolled in preschool (DEPP - Ministère de l'Éducation, 2021).

² In 2020, 87% of children at the preschool level are enrolled in a public school (DEPP - Ministère de l'Éducation, 2021).

the development of language, motor and numeracy skills. Children receive 24 hours per week of instruction although part-time attendance is common during the first year of preschool. Teachers are civil servants recruited at the bachelor's (prior to 2010) or master's level (as of 2010), with usually two years of specific training to the teaching profession. Teachers are recruited to work either at the preschool or primary level so their professional training focuses more on primary school pupils than preschool ones and rarely include a specific training regarding two-year-old children. The average class size in public preschools has decreased during the 2010s to reach 23 children in 2020 (DEPP - Ministère de l'Éducation, 2021). Two-year-old children can be gathered in a specific class but, in public schools, 93% of them join a class with older children (Abdouni, 2016).

Early schooling attained a pick in 2000 when 35% of two-year-olds were enrolled in preschools but this proportion has decreased ever since. This decrease has been larger in public schools and is partly explained by the increase, since 2000, of the number of children aged 3 to 5 who are given priority (Ben Ali, 2012). Between 2011 and 2015, around 11% of two-year-old children were enrolled in preschools. The recent legislative framework specifies that early schooling is organized in priority in socially disadvantaged areas because it is “an efficient way to promote school success especially when, for social, cultural or linguistic reasons, the family is far from the school culture” (Circulaire n° 2012-202, 2012). Administrative data confirm that early schooling is more common in urban areas and in socially disadvantaged areas (Abdouni, 2016). There are also important disparities in early schooling across regions. For example, in 2011, 35% of two-year-olds were enrolled in preschool in the north and west of France compared to only 3% in Paris area (Ben Ali, 2012).

Apart from preschool, other formal child-care provisions are available in France for children under age 3. Most commonly, young children are cared by a childminder (*assistante maternelle*) or attend a centre-based childcare programme (*crèche*). Both options are regulated at the state level, including staff requirements. It is important to note that these childcare alternatives are partly publicly funded (through direct subsidies or tax credits) but still entail higher costs for families than preschool attendance which is completely free in public schools.

4. Data & method

4.1 Data

The analysis draws upon the survey Elfe, a national longitudinal survey following 18 329 French children born in 2011. Children were recruited at birth from 320 maternity units randomly selected in metropolitan France (Charles et al., 2020). Recruitment took place during four time periods in early April, early July, early October and early December. The survey includes telephone interviews of both parents at age 2 months, 1 and 2 years, and of one parent (the mother or, if not available, the father) at age 3.5 years³. In addition, a home visit was organized at age 3.5 years. Among the initial selected children at birth, 10 724 have participated in all interview waves between birth and age 3.5. Families who dropped out of the survey are more likely to be socially disadvantaged (Charles et al., 2020). Since our analytical strategy

³ Precisely, the survey at 2 years was released in four time periods (following the first survey in maternity units) and the survey at 3.5 years was realized in September 2014 for children born in April or in July 2011 and in February 2015 for children born in October or December 2011. Thus, children were between 3.4 and 3.9 years old.

relies on controlling for the baseline level of skills, we further exclude 46 children already enrolled in preschool when parents were interviewed at age 2.

4.2 Variables

Our main variable of interest is early schooling participation coded as a binary variable indicating whether the child entered preschool before September 2014, the regular entrance date for this cohort. We used information on the age of the child at preschool entrance, reported by the parent at age 3.5 and the quarter of birth of the child to identify whether he/she entered before September 2014. Based on this information, we could only identify children who entered preschool in September 2013 or January 2014, so the present article focuses on the effect of six months or more of early schooling. This should only introduce a small bias in the analysis as administrative data show that 93% of children entering preschool early do so either in September or in January (Abdouni, 2016).

Child development outcomes are assessed at age 3.5. One of the parents (usually the mother) was asked 44 items regarding what the child can do, using a French version of the Child Development Inventory (CDI) which has very good psychometric properties (Duyme & Capron, 2010). We look at the total score of development and at the specific skill domains separately: language skills (expressive language and language comprehension; 15 items), motor skills (gross and fine; 13 items), social and self-help skills (12 items) and four items measuring the child's knowledge of letters and numbers. In addition, non-verbal reasoning was measured by the test picture similarities module of the British Ability Scales (BAS), administered by an interviewer during the home visit. This test measures the ability to solve non-verbal problems, identify and attach meaning to pictures (Charles et al., 2020). All dependent variables are standardized to facilitate the comparison of effect sizes.

Our control variables include information on the child such as the exact age in months at the parental interview (or at the home visit for the analysis on non-verbal reasoning), sex, twin birth, month of birth, whether the child is the first child, number of siblings in the household, whether the child has a chronic disease. Regarding the social background of the family, we use information collected at age 2 about the highest educational degree of the mother, her working status (not working, working part-time, working full-time), whether a foreign language is spoken at home and the family structure (single mother, separated or cohabiting parents). We further include a variable indicating whether the child lives in a priority neighbourhood (*quartier prioritaire de la ville*, QPV). These neighbourhoods are characterized by a low average income and benefit from public investments to develop local employment and access to public services.

We also control for the main childcare when the child is two-year-old (family care, *assistante maternelle*, *crèche*, private nanny at home, other) and whether parents expressed a preference for early schooling at this age. A number of covariates regarding the child's experience of schooling and formal childcare at age 3.5 are included: intensity of preschool attendance (full-time, less than full-time or not at school), school sector (public, private or don't know), class size, number of times per week the child attends before/after school care⁴ and whether the child regularly participates in an out-of-school activity. Parental involvement when the child is 3.5 is

⁴ The *périscolaire* is a service organized by all municipalities to offer non-compulsory activities before and after the school day, often in the school premise.

measured using information on how often parents talk with their child about the school day, whether they have missed the parent-teacher conference and the number of home learning activities done with the child over the last month (out of seven different activities). General atmosphere at home is taken into account using the level of agreement, when the child is 3.5-year-old, with two statements regarding quietness and tidiness at home and we control for the total screen use per day of the child at age 3.5 (including television, computer, tablet and video games). Finally, we control for language and motor skills when the child is 2, just before possible enrolment in preschool. Language skills are assessed using a French short version of the MacArthur-Bates inventory (Kern et al., 2010). Mothers were asked whether the child can produce words used in daily life from a proposed list of 100 words. Motor skills are measured using the sum of seven items indicating the child's ability to walk up stairs, kick a ball, run, use a tricycle, put on slippers or socks, eat alone, and drink alone. Both language and motor skills score are standardized by age in months at age 2 interview. Descriptive statistics of all the variables in the analytical sample are displayed in table A in appendix.

4.3 Empirical strategy

The effects of early schooling participation on the different domains of child development are estimated by ordinary least squares (OLS) regressions. In a first model, we control for the variables regarding the demographic characteristics of the child, the familial socio-economic background, the local context, childcare mode and aspirations at age 2, schooling and care experiences at age 3.5, parental involvement and home atmosphere. In a second model we add the variables measuring language and motor skills when the child is two-year-old. The comparison between the two models indicates the importance of the selection bias due to differences in child development in access to early schooling. White-Huber heteroscedasticity robust standard errors are used in all models to correct for dependence among the repeated observations. 8% of children with data on the development outcome variables have missing data on one of the covariates and listwise deletion is used all analyses. We use survey weights only in the descriptive analysis since they are not a function of our dependant variables (Winship & Radbill, 1994).

In order to test whether access to early schooling is efficiently targeted towards disadvantaged children, we run a logistic regression model with independent variables about the children's demographics, situation and skills at age 2. Finally, we model the differential effect of early schooling by running separate OLS models on children with a low- (or high-) educated mother and children with a low (high) level of language skills at age 2. Since we are interested in the total differential effect of early schooling for these groups, we do not control for any potential mediating variables in these models (such as parental involvement, childcare at age 2, screen use etc...). We only control for the month of birth and age in months when skills are measured since these two variables are strongly correlated with scores at age 3.5 but not with maternal education.

5. Results

5.1 The effects of early schooling participation on children development at age 3.5

Table 1 displays the OLS results regarding the effects of early schooling on the different development outcomes at age 3.5.

[Table 1]

Results show that early schooling has a positive effect on the total CDI score. Controlling for the demographic characteristics of the child, the familial socio-economic background, the local context, schooling and care experiences, parental involvement and home atmosphere, early schooling is associated with an increase of a quarter of a standard deviation (SD) in the total CDI score (model 1). Controlling for language and motor skills at age 2 reduces this effect but it still amounts to 17% of a SD. The decrease of 30% in the effect size between model 1 and 2 confirms that children who participate in early schooling have higher levels of development before enrolment and that this partly explains the positive association between early schooling and child development. Looking at the specific developmental domains assessed in the CDI test, results show that the effect of early schooling participation is higher for motor skills (+23% of a SD in model 2) and the knowledge of letters and numbers (+12% of a SD), followed by language skills (+9% of a SD). Only for social and self-help skills, is the association with early schooling only significant at the 10% level and amounts to 6% of a SD. Further analyses (available upon request) reveal that early schooling has a larger effect on social skills (+12% of a SD in model 2, significant at the 1% level) but null for items related to self-help skills. Ignoring the positive selection of children in early schooling leads to an overestimation of the estimated effect of early schooling which is larger for language and social & self-help skills (around -40% between model 1 and 2) but less important for the knowledge of letters and numbers (-20%) and motor skills (-15%).

Finally, results regarding non-verbal reasoning measured by the BAS show that early schooling has no effect on this skill domain. Whether we control for skills at age 2 or not, the association between early schooling and non-verbal reasoning is not statistically significant and is close to 0.

5.2 Access to early schooling

Table 2 displays the results of the logistic regressions regarding the participation in early schooling. Results of model 1 (not taking into account the baseline level of skills) show that the child's month of birth has, by far, the largest effect on participation in early schooling as children born in December are 20 p.p. less likely to enter preschool before the regular entrance age than children born in April.

Other variables slightly increase the probability to enter preschool early such as having two or more siblings (+3 p.p.), having a chronic disease (+1 p.p.), having a working mother (+2 p.p.), being cared by the family at age 2 (+ 4 p.p. compared to children in *crèche*). Unsurprisingly, children whose parents express a preference for early schooling are also more likely to enter preschool early (+4 p.p.).

[Table 2]

Results regarding the effect of the socio-economic variables are more mixed. We find that children living in priority neighbourhoods and those with a low-educated mother are slightly more likely to access early schooling. However, the opposite is true for children speaking a foreign language at home and those with a single mother.

Finally, model 2 confirms that children with higher language and motor skills at age 2 are more likely to enter preschool early and the effect size is equivalent for both skill domains (+2 p.p. for children in the third tertile of performance). Since the proportion of children entering

preschool early is relatively low in this cohort (9%, see table A in appendix) these effects are not negligible.

5.3 The effects of early schooling participation for different subgroups

Results on the differential effect of early schooling depending on maternal level of education and language skills at age 2 (Table 3) suggest that the association between early schooling and development outcomes is far from being homogenous for these different groups. Overall, children with a low-educated mother and children with language skills below the median at age 2 benefit more from early schooling. The effect of early schooling on the total CDI score for children with a low-educated mother is 50% higher than for children with a high-educated one (columns 1 & 2). The gap is even larger based on language skills at age 2 as the effect for low-skilled children is more than twice as large than for high-skilled children (columns 3 & 4).

[Table 3]

The differential effect depending on maternal education is larger for language skills (with an effect almost twice larger for children with a low-educated mother) and the knowledge of letters and numbers (almost three times larger). Conversely, the gap is much smaller for motor skills and social and self-help skills. In addition, early schooling allows children with a lower level of language development to partially catch up as early schooling leads to an increase of 16% of a SD compared to a null effect for high-skilled children. It also develops social and self-help skills mainly for low-skilled children (an effect almost four times larger) while the effect is equivalent for both groups regarding the knowledge of letters and numbers. Only for non-verbal reasoning skills, is the effect of early schooling not statistically significant for any subgroup.

6. Discussion

The analyses presented in this article provide several important results regarding the effects of early schooling on children development. Firstly, early schooling has a positive effect on development at age 3.5. This result is noticeable because, in the French context, early schooling occurs at age 2 and school-based programmes may not be well suited to these very young children. We further show that the effects of early schooling differ largely depending on the developmental domains. It has a null effect on non-verbal reasoning, a small effect on social and self-help skills, language skills and the knowledge of letters and numbers. The largest effect of early schooling at age 2 is found for motor skills. Additional analyses (available upon request) show that the effect of early schooling is larger for fine motor skills (+22% of a SD) than for gross motor skills (+13%). This is a promising result since an extensive literature concludes to a positive relationship between motor skills and future academic performance in reading and mathematics, especially for fine motor skills (for an overview see Macdonald et al., 2018). Following the embodied cognition approach, fine motor skills and cognitive skills would be linked by shared internalized motor processes and neuronal circuits (Suggate et al., 2019). Thus, the positive effect of early schooling on motor skills, and especially on fine motor skills, is expected to translate into better academic skills in the school career.

The heterogeneity analyses further suggest that early schooling is more beneficial for children with a low-educated mother than children with a high-educated mother, but the latter still

benefit from this policy. In contrast, other studies find that early schooling at age 4 entails no benefit for socially advantaged children (Becker, 2011; Dumas & Lefranc, 2010; Leuven et al., 2010). Becker (2011) argues that early schooling may benefit only disadvantaged children because socially advantaged children would already be exposed to stimulating environment at home and early schooling would not increase it. We do not find support for this hypothesis for children between age 2 and 3.5. Thus, universal early schooling at age 2 can contribute to reduce some gaps in child development but will not close them, which is consistent with results from Cebolla-Boado et al. (2017). This conclusion points to the need to target disadvantaged children in order to further equalize development outcomes. Kulic et al. (2019) stress that the effect of early education programmes on social equality depends on the utilization gap by social background. In the Elfe cohort, we find that socially disadvantaged children are slightly more likely to access early schooling, at least when considering children living in disadvantaged areas and those with a low parental education. This represents a noticeable progress in the French context as Jarousse & al. (1992) showed that, in a cohort of children born in the mid-eighties, disadvantaged families had less access to early schooling. However, the higher access of socially disadvantaged children is not systematic depending on the nature of the disadvantage considered. Importantly, we find that children who speak a foreign language at home have less access to early schooling although these children are explicitly mentioned as the expected beneficiaries of this policy (Circulaire n° 2012-202, 2012). Children speaking a foreign language at home can be migrant or born in France but their parents are more likely to be unfamiliar with how school works in this country (Audren et al., 2018). This result stresses the potential informational barriers in access to early schooling, for children who may most benefit from it.

Another important result deals with the access and benefits from early schooling depending on children's baseline level of skills. This question has not been addressed previously in the literature for lack of appropriate data. We find that the benefits of early schooling on development outcomes at age 3.5 are twice as large for children with a lower level of language skills at age 2 than for children with a higher level. This gap is much larger than the estimated differential effect by maternal education. However, we find that children with a lower level of skills at age 2 are significantly less likely to have access to early schooling. This confirms that children who access early schooling are positively selected in terms of skills and that it is crucial to take into account this selection bias to avoid overestimating the returns of early schooling policies. It also suggests that early schooling in France mainly welcome the small proportion of high-skilled children from disadvantaged background. In order to narrow the gaps in child development, children from disadvantaged background with lower skill levels should be taken into account in the implementation of schooling and care policies. One solution would be to adapt the conditions and context of early schooling to welcome more children with lower levels of development. Alternatively, access to another formal care programme, such as *crèche*, should be granted to these children as it also leads to significant improvements in child development (Berger et al., 2021). However, it is important to keep in mind that the cost of a *crèche* slot reaches 15 000€ a year (Pora, 2020), more than the double than a year in preschool (7 110€ in 2019, DEPP - Ministère de l'Éducation, 2021).

7. Conclusion

The present article estimated the effect of early schooling at age 2 on different skill domains at an early age and was able to account for many potential confounding factors, including children

baseline level of language and motor skills. Overall, the results show a positive effect of early schooling on some skill domains including motor skills, language skills and the knowledge of letters and numbers but none on non-verbal reasoning skills. The positive effects are larger for socially disadvantaged children and those with the lowest level of skills before enrolment. However, we find that children who could benefit the most from early schooling are not systematically the ones who are more likely to access it. The objective to target in priority disadvantaged children is met when taking into account parental education and the area of residency, but we find that children speaking a foreign language at home and those with the lowest level of skills are less likely to access early schooling. Our results thus raise the question of the targeting of this policy in order to better contribute to reducing developmental gaps between children in France. A recent political initiative aims to widen preschool access under age 3 in some priority neighbourhoods (*'cités éducatives'*) and it will be important to see whether its implementation has an effect on enrolment of socially disadvantaged two-year-olds.

We should also stress some limitations of this work and directions for future research. First, the analyses rely on parental answers regarding their children's abilities. Our measures of language and motor skills at age 2 and the Child Development Inventory for outcomes at age 3.5 are all based on parental questionnaires. Although these tests have demonstrated their validity, it cannot be excluded that a desirability bias affect the answers provided. This may be an issue for our estimates if parents who enrol their child at age 2 in preschool report differently on their child's development. Second, we estimated the effect of early schooling on a variety of skill domains but not on the affective development of children. It remains unclear whether the school context, with a class size of more than twenty children, is well suited for children under age 3 (Brisset & Golse, 2006). Our work shows that children benefit from this exposure in some skill domains but does not allow to draw conclusions regarding the consequences in terms of well-being and affective development. Third, we only measure the short-term effects of early schooling. We estimated whether early schooling can contribute to giving all children an equal start in the school career but future research is needed to determine whether the positive effects found at age 3.5 persist and translate into better school outcomes.

8. References

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TABLES

Table 1: OLS coefficients of early schooling participation on development outcomes at 3.5 years

Outcome (standardized)		Model 1	Model 2
Child Development Inventory score, total	Early schooling	0.24*** (0.03)	0.17*** (0.03)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.241	0.356
	Observations	9,809	9,809
Language score from the Child Development Inventory	Early schooling	0.16*** (0.03)	0.09*** (0.03)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.123	0.270
	Observations	9,809	9,809
Motor skills score from the Child Development Inventory	Early schooling	0.27*** (0.04)	0.23*** (0.04)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.175	0.222
	Observations	9,809	9,809
Social & self-help skills score from the Child Development Inventory	Early schooling	0.10*** (0.03)	0.06* (0.03)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.128	0.171
	Observations	9,809	9,809
Letters & numbers score from the Child Development Inventory	Early schooling	0.15*** (0.04)	0.12*** (0.04)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.243	0.270
	Observations	9,809	9,809
Non-verbal reasoning score from the British Ability Scale	Early schooling	0.05 (0.05)	0.03 (0.05)
	Controls for language & motor skills at 2 years	No	Yes
	R-squared	0.053	0.067
	Observations	7,847	7,847

Notes: White-Huber heteroscedasticity robust standard errors in parentheses. All models control for a set of covariates about the demographic characteristics of the child, the familial socio-economic background and aspirations, the local context, schooling and care experiences, parental involvement, screen use and home atmosphere at age 3.5.

***p<0.01, **p<0.05, *p<0.1

Source: Elfe. Children with questionnaire at age 2 administered before starting preschool.

Table 2: Logistic regression of participation in early schooling (Average Marginal Effects)

Demographic characteristics of the child		Model 1		Model 2	
Sex	Boys (Ref.)				
	Girls	0.01	(0.00)	0.00	(0.00)
Twin birth	No (Ref.)				
	Yes	-0.00	(0.02)	-0.00	(0.02)
Month of birth	Early April (Ref.)				
	Early July	-0.13***	(0.01)	-0.13***	(0.01)
	Early October	-0.20***	(0.01)	-0.20***	(0.01)
	Early December	-0.20***	(0.01)	-0.21***	(0.01)
First child of the mother	No (Ref.)				
	Yes	-0.00	(0.01)	-0.00	(0.01)
Number of siblings/step-siblings in the household at age 3.5	No sibling (Ref.)				
	1 sibling	0.01*	(0.01)	0.01*	(0.01)
	2 siblings or more	0.03***	(0.01)	0.03***	(0.01)
Chronical disease between age 2.5 and 3.5	No (Ref.)				
	Yes	0.01**	(0.01)	0.01***	(0.01)
Social background at age 2					
Highest degree obtained by the mother	Less than baccalaureate (Ref.)				
	Baccalaureate	0.00	(0.01)	0.00	(0.01)
	Higher education	-0.01**	(0.01)	-0.02**	(0.01)
Mother's working status	Not working (Ref.)				
	Working part-time	0.02***	(0.01)	0.02***	(0.01)
	Working full-time	0.02**	(0.01)	0.01**	(0.01)
Foreign language spoken at home	No (Ref.)				
	Yes	-0.02***	(0.01)	-0.02***	(0.01)
Family structure	Parents live together (Ref.)				
	Parents don't live together	0.00	(0.01)	0.00	(0.01)
	Single mother	-0.02*	(0.01)	-0.02*	(0.01)
Residence of the child at age 2					
Priority Neighborhood (QPV)	No (Ref.)				
	Yes	0.02*	(0.01)	0.02*	(0.01)
Child's situation at age 2					
Main childcare	Family care (Ref.)				
	Private nanny at home	-0.05***	(0.01)	-0.05***	(0.01)
	Assistante maternelle	-0.02**	(0.01)	-0.02***	(0.01)
	Crèche	-0.04***	(0.01)	-0.04***	(0.01)
	Other	-0.01	(0.02)	-0.01	(0.02)
Preference for early schooling	No (Ref.)				
	Yes	0.04***	(0.01)	0.04***	(0.01)
Skills at age 2					
Standardized language score by age in month, tertile	1st tertile (Ref.)				
	2nd tertile			0.01**	(0.01)
	3rd tertile			0.02***	(0.01)
Standardized motor skills score by age in month, tertile	1st tertile (Ref.)				
	2nd tertile			0.01**	(0.01)
	3rd tertile			0.02***	(0.01)
	Log likelihood	-1954		-1939	
	Pseudo R2	0.191		0.197	
	Observations	9,809		9,809	

***p<0.01, **p<0.05, *p<0.1

Source: Elfe. Children with questionnaire at age 2 administered before starting preschool.

Table 3: OLS coefficients of early schooling participation on development outcomes at 3.5 years, by maternal education and language skills at age 2.

		Maternal education		Language skills at age 2	
		Less than higher education	Higher education	Low	High
Outcome (standardized)		(1)	(2)	(3)	(4)
Child Development Inventory score, total	Early schooling	0.35*** (0.06)	0.23*** (0.04)	0.30*** (0.06)	0.13*** (0.03)
	R-squared	0.059	0.061	0.050	0.087
	Observations	2,960	6,849	4,773	5,036
Language score from the Child Development Inventory	Early schooling	0.23*** (0.06)	0.12*** (0.04)	0.16** (0.06)	0.01 (0.02)
	R-squared	0.021	0.011	0.015	0.009
	Observations	2,960	6,849	4,773	5,036
Motor skills score from the Child Development Inventory	Early schooling	0.36*** (0.06)	0.29*** (0.05)	0.35*** (0.06)	0.21*** (0.05)
	R-squared	0.063	0.063	0.054	0.068
	Observations	2,960	6,849	4,773	5,036
Social & self-help skills score from the Child Development Inventory	Early schooling	0.18*** (0.06)	0.14*** (0.04)	0.22*** (0.06)	0.06 (0.04)
	R-squared	0.016	0.013	0.013	0.014
	Observations	2,960	6,849	4,773	5,036
Letters & numbers score from the Child Development Inventory	Early schooling	0.27*** (0.07)	0.10* (0.05)	0.13** (0.06)	0.12** (0.05)
	R-squared	0.084	0.097	0.093	0.090
	Observations	2,960	6,849	4,773	5,036
Non-verbal reasoning score from the British Ability Scale	Early schooling	0.09 (0.08)	0.03 (0.06)	-0.00 (0.08)	0.03 (0.06)
	R-squared	0.026	0.031	0.024	0.033
	Observations	2,227	5,620	3,743	4,104

Notes: White-Huber heteroscedasticity robust standard errors in parentheses. All models control for month of birth and age in months when development outcomes are measured.

***p<0.01, **p<0.05, *p<0.1

Source: Elfe. Children with questionnaire at age 2 administered before starting preschool.