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Early childcare, maternal education and family origins: differences in cognitive and linguistic outcomes throughout childhood

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Early childcare, maternal education and family origins: differences in cognitive and linguistic outcomes throughout childhood*

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Abstract:
Centre-based care in early childhood has been associated with better scores on linguistic and cognitive tests at later times. Nevertheless, there is a lack of consensus about the stability of these effects across the preschool and primary school stages. Furthermore, no data about the effects of early care have been reported from the Italian context. Using a cross-sectional design, our study analysed the effects of early childcare, maternal education and parental origin (native versus foreign) on the cognitive and linguistic outcomes of 175 three- to ten-year-old children, from a Northern Italian city. Analysis of the single effects of type of care, maternal education and parental origin on children's outcomes, showed no differences. When the interactions among these variables were explored, centre-based care appeared to play a protective role with respect to maternal education, whereas home-based care appeared to play a protective role with respect to parental origin. The importance of educational intervention and training for professionals to better support children's development will be discussed.

Keywords: creche; parents' origin; immigrant status; language; cognitive functioning

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1. Introduction

In early childhood, babies and toddlers can receive two main types of care: centre-based and home-based. In centre-based care, children experience living in a group setting with adults and peers, and routines, spaces and toys are organized with the management of a group of children in mind; moreover, the adults taking care of them are trained professionals. In home-based arrangements, children are more likely to be alone with adults or to share routines and toys with a very small number of other children, usually younger or older siblings (Musatti & Picchio, 2010). In these informal settings, caretakers are usually mothers, grandparents or non-professional baby-sitters. In Italy, the level of grandparent involvement in childcare is very high: about 30% of grandparents take care of grandchildren on a daily basis, versus 15% in Germany and 2% in Sweden or Denmark (Arpino, Pronzato & Tavares, 2014).

The tendency to choose centre-based care is influenced by several factors, most of which are parent-related: these include parents' SES and occupational status, their values concerning their child's need for socialization and for a stimulating education and their own need to be supported in their parenting role (Musatti & Picchio, 2010). Thus, the choice of type of childcare is affected by multiple variables, while the different types of childcare provide different educational experiences that can influence children's development.

The literature emphasizes that type of care is associated with children's later cognitive and linguistic development. Children who receive centre-based care in different periods of early childhood have been found to obtain better scores on linguistic and cognitive tests at preschool age with respect to children with fewer experiences of centre-based care (Broberg, Wessels, Lamb, & Hwang, 1997; Loeb, Bridges, Bassok, Fuller, & Rumberger, 2007; Magnuson, Ruhm, & Waldfogel, 2007; NICHD ECCRN, 2002; 2004). This association is significant but modest (Belsky, Vandell, Burchinal, Clarke-Stewart, McCartney, & Owen, 2007; NICHD ECCRN, 2006). Nevertheless, the positive effect of centre-based care in early childhood has been linked to specific characteristics of the care experience, including quality of childcare (Burchinal, Peisner-Feinberg, Bryant, & Clifford, 2000; NICHD ECCRN, 2006; Peisner-Feinberg et al., 2001) and starting centre care between ages 2 and 3 years (Loeb et al., 2007; Sammons et al., 2004). The effect of the amount of early childcare received appears to depend on the age at which it is assessed: NICHD ECCRN (2006) and Loeb et al. (2007) found positive correlations between intensity of day care and cognitive outcomes at late

preschool age (around 5 years), whereas Landvoigt, Muehler and Pfeiffer (2007) found a negative correlation when cognitive outcomes were assessed between 12 and 14 years of age. However, it should be noted that in the latter study, secondary school track choice was used as a proxy for children's cognitive development and no direct measures were collected.

There is no consensus in the literature concerning the duration of these positive effects of attending centre-based care. According to some studies, the linguistic advantage does not last beyond preschool age (Barnett, 1995; Magnuson et al., a 2007; NICHD ECCRN, 2005), whereas Datta Gupta and Simonsen (2012) found external care at age 3 years to have a positive impact on language ability at age 11 years. According to Datta Gupta and Simonsen (2012), the cognitive advantage can no longer be detected at the primary school stage, whereas other authors reported that it lasted up to primary school (Barnett, 1995; Broberg et al., 1997; NICHD ECCRN, 2005), disappeared in the first year of primary school (Magnuson et al., 2007) or in sixth grade (about 11-12 years of age; Belsky et al., 2007).

Positive cognitive and linguistic outcomes in children are also affected by other variables, including parental education and immigrant status. Maternal education is positively associated with cognitive outcomes (NICHD HLB, 1998; NICHD ECCRN, 1997; Peisner-Feinberg et al., 2001; Sammons et al., 2004): children whose parents have not completed high school display lower levels of achievement in first grade (Magnuson et al., 2007; Sammons et al., 2004). Better-educated parents spend more time with their children than parents with a lower level of education: they are more aware of the link between investing time in their children and the latter's future development; they are more likely to be critical of substitutes for parental care; and, last but not least, are more likely to interiorise and implement the social norms and behaviours associated with "involved parenting" (Craig, 2006; Monna & Gauthier, 2008; Sayer, Gauthier, & Furstenberg, 2004). Parental education affects the allocation of time to children, even when national welfare policies, such as income support for families, parental leave, reduced employment hours and provision of centre-based care (Sayer et al., 2004) have been controlled for. The amount of time that mothers allocate to childcare appears to be primarily related to their beliefs about the characteristics of good parenting (Sayer et al., 2004). Furthermore, maternal education is associated with the type of care selected for children: more highly educated mothers are more likely to use centre-based childcare whereas women with a lower level of education more frequently opt to provide exclusive maternal care (NICHD ECCRN, 2006).

Cognitive and linguistic development is also affected by immigrant status. Not just a question of cultural belonging, immigrant status is a condition with specific features related to entering a new social context: for example, separation from one's family, changes in economic status, negative stereotypes and discrimination, language barriers and higher levels of stress (De Feyters & Winsler, 2009). Immigration is affecting a growing number of children in Europe and research on immigrant populations can provide new insights into developmental processes and inform social policy (Garcia Coll et al., 1996; Quintana et al., 2006). In one study conducted in the UK, the children of foreign parents (categorized as White European, Black, Pakistani, Bangladeshi, Other) obtained lower language scores than children whose parents were native to the UK, after maternal education, SES, number of siblings and other family characteristics had been controlled for (Sammons et al., 2004). Research by De Feyter and Winsler (2009) showed that, among low-income families, non-immigrant pre-schoolers outperformed immigrant pre-schoolers in cognitive and linguistic skills; and interestingly, first generation immigrants appeared to have better cognitive and linguistic skills than second generation children, although this pattern was partly linked with ethnicity (Latinos vs. Blacks). Thus, immigration can provide advantages. Very often, the immigrant condition combines with other variables that affect children's development, such as poverty status and dual language learning, whereby children acquire both their parents' mother tongue and the language of the host country. When only the mother tongue is spoken in immigrant families, immigrant children outperform US-born children in mathematical skills on school entry; on the other hand, immigrant children whose parents only spoke the host country language, display lower cognitive skills (Winsler et al., 2014). Finally, immigrant children and children of foreign-born parents are less likely to attend early centre-based care (Sammons, et al., 2004; Turney & Kao, 2009; for a review: De Feyters & Winsler, 2009).

The aim of the present cross-sectional study was to analyse the role of early childcare experience in the cognitive and linguistic development of preschool and school age children in Italy, exploring how early care interacts with other key variables in the Italian context, namely maternal education and having native versus foreign parents.

Many factors support the value of making a specific study of Italian centre-based care: the well-established tradition of early childhood services in Italy, the recognised excellence of some of them such as Reggio Children (www.reggiochildren.it), the innovative nature of certain practices widely implemented in Italian ECECs, such as the *inserimento* ("settling in" phase,

Bondioli & Mantovani, 2001), and the emphasis on relationships that characterizes the Italian care model in general (Ongari, 2012). To our knowledge, this study is the first to analyse the effects of early care on the outcomes of Italian preschool and school-aged children. A recent study conducted in Italy by Del Boca, Pasqua, and Suardi (2015) focused on early childcare and secondary school achievement.

In Italy, early centre-based care is provided through a range of public or private facilities: including *nido* (day nursery) and other types of centre for children (for a description, see Musatti & Picchio, 2010). In 2010/11, 14.0% of Italian children between 0 and 2 years of age were enrolled in centre-based care, with marked differences among the different geographical regions: for instance, in the North, 29.4% of children attended day care in Emilia Romagna and 15.4% in Piemonte, while in the South, percentages varied from 9.6% in Abruzzo to 2.4% in Calabria (Istat, 2012).

Although only some Italian regions have almost met the Barcelona objectives, which were "to provide childcare by 2010 to […] at least 33% of children under 3 years of age" (European Commission, 2013, page 4), the quality of centre-based care in Italy is generally good. Moreover, Italian law recognises that children have the right to education from birth and that centre-based care bears a dual function: caring for children and helping parents to balance work with family life (Law n. 1044/1971; Scopesi & Viterbori, 2008). Recent legislative proposals emphasize the need to include the "planning of preschool educational services within the framework of general policies in support of children and their families and aimed at fighting poverty and social exclusion" (Parliamentary Bill n. 1260, 2014, p. 3, authors' translation).

Thus, comparing the effect of centre-based and home-based care in the Italian context can provide novel information about the impact of day-care. Given that type of care is only one of many factors influencing children's development, the current study also examined two of the other important variables mentioned above: maternal education and immigrant status.

In light of the literature on the topic, we predicted four main results:

1) that the choice of type of care would vary as a function of maternal education: specifically, that centre-based care would be mainly chosen by more highly educated mothers;
2) that the choice of type of care would vary as a function of parental origin: specifically, that centre-based care would be mainly chosen by native Italian parents;
3) that both a high level of maternal education and centre-based care would have a positive effect on children's outcomes
4) that having foreign-born parents would have a negative effect on children's verbal ability outcomes.

In light of the debate about the stability of centre-based care effects, all our analyses were carried out on both pre-school and primary school subsamples in order to explore the duration of any type-of-care effects.

2. Method

2.1 Participants

The sample comprised 175 three- to ten-year-old children, from a large Northern Italian city (Table 1). Data were collected between 2009 and 2012. Children were recruited at preschools and primary schools, and in a few cases via personal contacts. All families provided written informed consent for their child's participation in the research. Four additional children (all boys, average age = 94 months) were excluded from the analysis, because of errors in the procedure. Parents and teachers reported that all children spoke Italian and were not affected by medical, psychological or developmental disorders. Italy was the birthplace of 98.9% of the children (N = 173), while 1.1% had been born in other European countries (N = 2).

Table 1. Description and comparison of the samples

	Total	**Preschoolers**		**Pupils**		
Variable	*N (%)*	*N (%)*		*N (%)*		*Chi² (two-tailed)*
Sample size	175	94		81		
Girls	85 (48.6)	50 (53.2)		35 (43.2)		.19, df = 1 p = .225
Center-based care	79 (45.1)	46 (48.9)		33 (40.7)		1.18, df = 1 p = .291
Maternal Education						
Lower secondary school	90 (51.4)	39 (41.5)		51 (63.0)		
Upper secondary school	65 (37.2)	44 (46.8)		21 (25.9)		9.02, df = 2 p = .011
Higher education	20 (11.4)	11 (11.7)		9 (11.1)		
Parental Origins						
Both Italians	129 (73.8)	73 (79.3)		56 (69.1)		
One foreign	24 (13.7)	9 (9.8)		15 (18.5)		3.05, df = 2 p = .217
Both foreign	20 (11.4)	10 (10.9)		10 (12.3)		
	M (SD)	*M (SD)*	*range*	*M (SD)*	*range*	*t-test (two-tailed)*
Child age (months)		38.5 (8.3)	39-69	89.0 (17.4)	70-124	
IQ		101.1 (12.5)	73-141	98.4 (14.6)	73-133	t(173) = 1.33 p = .183
VQ		80.7 (17.4)	64-130	90.7 (15.9)	64-129	t(173) = -4.52 p < .001

Seventy-nine of the children had attended centre-based care and 96 children had received home-based care (Table 1) in their early years: of the latter category, 15 children had been in exclusive maternal care (15.6%), 56 had been looked after by other family members (usually grandparents, in few cases aunts; 58.3%), 2 children received care from babysitters who were not relatives (2.1%); for 23 children, the exact type of home-based care was not specified (24%).

With regard to parental origins, 129 children had two native parents (73.8%), 24 had one foreign-born parent (13.7%) and 20 had two foreign-born parents (11.4%), whereas for 2 children this information was not available (1.1%). In our sample, the percentage of children with two foreign-born parents is slightly higher than in the Italian population: between 2009 and 2012 this percentage went from 8.1% to 9.2% in kindergartens and from 8.7% to 9.5% in primary schools (Miur–Ufficio di Statistica, 2013).

In terms of education, in the overall sample 51.4% of mothers had completed lower secondary school (N = 90), 37.2% held an upper secondary school diploma (N = 65) and 11.4% had a university qualification (N =20). Overall, the sample displayed a lower level of educational achievement than the Italian population between 25 and 64 years of age in 2011, in which 44% had completed lower secondary education, 41% upper secondary education and 15% third level education (OECD, 2014).

To investigate the stability of the child-care effect, the sample was divided into two subgroups, preschoolers and primary students. Table 1 describes and compares the two subsamples.

2.2 Measures

Tests. The Leiter-R (Roid & Miller, 2002) was used to assess non-verbal IQ; the *Peabody Picture Vocabulary Test-R* (Dunn & Dunn, 1981), in its Italian version (Stella, Pizzoli, & Tressoldi, 2000), was used to assess receptive language abilities. The two tests were administered at kindergarten or at school, at two separate sessions within a month of each other; each session took about 15-30 minutes depending on the test and on the child's age.

Socio-demographic questionnaire. Parents were asked to complete a questionnaire on their socio-demographic background, which assessed both parent-related characteristics (place of birth, level of education, first language spoken at home) and child–related characteristics (birthplace, gender, presence of siblings, type of childcare).

For each child, parents' place of birth was coded as follows: (0) both parents native Italians, (1) one native Italian parent and one foreign-born parent and (2) both parents foreign-born.

Parents' educational level was coded following the Italian school system: the label "lower secondary education" was assigned when subjects had attended at least 8 years of compulsory education; "upper secondary education" when they had attended about 13 years of school and "higher education" when they had attended at least 16 years of school/university, with bachelor's, master's and doctoral degrees collapsed together into a single category.

2.3 Data Analysis

Because there was a different number of children in each of the two conditions (maternal education and parental origin), we performed non-parametric exact tests, Mann-Whitney for comparing two independent samples and Kruskal-Wallis tests for three independent samples. The Bonferroni correction was used to establish the acceptable level of significance for comparing pairs of subgroups via multiple comparisons.

Analyses were first carried out on the overall sample, and then on the two subsamples of pre-schoolers and primary school children, in order to investigate the stability of the effect of type of care over time.

2.4 Normality tests

The observed IQ score ranged from 73 to 141 (M = 99.84, SD = 13.54), and the VQ score from 64 to 130 (M = 85.32, SD = 15.21). Preliminary descriptive analyses confirmed that data distribution was normal for both IQ and VQ (Kolmogorov-Smirnov tests: IQ: skewness = .35, kurtosis = -.01, $p > .10$; VQ: skewness = .48, kurtosis = -.35, $p > .10$).

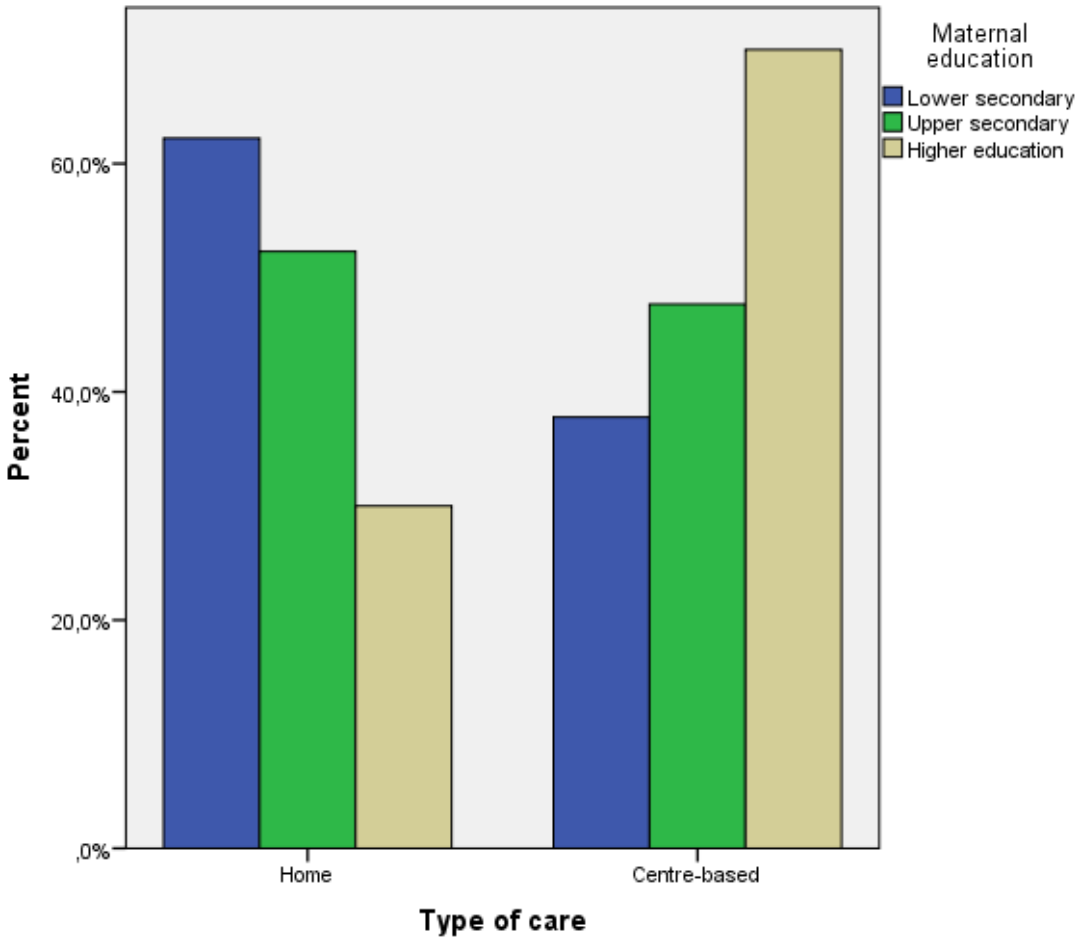
3. Results

3.1 Type of care chosen and family characteristics

Maternal education affected the type of care chosen: 62% of mothers with lower secondary education and 52% with upper secondary education chose home-based care, whereas 70% of university-educated mothers opted for centre-based care (Kruskal-Wallis Exact Test, Monte Carlo Method, $\chi^2 = 7.09$, $p < .05$). Two groups were significantly different to one another: mothers with lower secondary education and those with university degrees (Mann-Whitney Exact Test, Monte Carlo Method, U = 610.00, $p < .015$: see Graph 1).

Parental origin did not affect the type of care chosen: 45% of native Italian parents, 50% of mixed parents and 35% of foreign-born parents chose centre-based care but these differences were not statistically significant (Kruskal-Wallis Exact Test, Monte Carlo Method, $\chi^2 = 1.03$, $p = .605$).

Figure 1. Choice of type of care by maternal education.



3.2 Single effects of type of care, maternal education and parental origin

Type of care did not affect linguistic and cognitive outcomes. The IQ of children who had been in home-based care in early childhood did not differ from that of children who had received centre-based care (Mann-Whitney Exact Test, Monte Carlo Method, for total sample: U = 3596.00, p = .559; see Table 2, Column 4). The same pattern of results was observed for VQ (Mann-Whitney Exact Test, Monte Carlo Method, for total sample: U=3437.50, p = .286; see Table 3, Column 4).

Both IQ and VQ rose significantly with maternal education (Table 2, Row 3 and Table 3, Row 3). Both the IQ and VQ of children whose mothers had completed lower secondary education were significantly lower than those of children whose mothers held a university degree (Table 2, Row 3 and Table 3, Row 3); the significant difference between mothers with upper secondary education and a university-level qualification concerned only IQ (Table 2, Row 3).

Parental origin affected neither IQ (Table 4, Row 3) nor VQ (Table 5, Row 3): no differences emerged among children raised by native Italian, mixed or foreign-born parental couples.

Table 2. Mean (SD) IQ scores by type of care and maternal education

		Maternal education									
		1		*2*		*3*		*4*			
		Lower secondary		*Upper secondary*		*Higher education*		*Total*		χ^2 (*)	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	56	95.9 (11.9)[a]	34	100.8 (12.7)[b]	6	120.2 (10.3)[a, b]	96	99.2 (13.3)	2.80	< .001
2	*Centre-based*	34	99.2 (14.3)	31	99.8 (12.9)	14	106.1 (14.2)	79	100.7 (13.8)	14.38	.247
3	*Total*	90	97.2 (12.9)[a]	65	100.3 (12.7)[b]	20	110.3 (14.5)[a, b]	175	99.8 (13.5)	13.63	.001

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] $p < .001$ and [b] $p < .01$). (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

3.3 Joint effect of type of care and maternal education

When type of care and maternal education were examined together, an effect of type of care emerged, in interaction with maternal education.

Table 3. Mean (SD) VQ scores by type of care and maternal education

		Maternal education									
		1		*2*	*3*		*4*				
		Lower secondary		*Upper secondary*		*Higher education*		*Total*		χ^2 (*)	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	56	81.5 (14.1)[a]	34	85.6 (15.8)[b]	6	102.8 (13.1)[a, b]	96	84.3 (15.4)	9.67	.005
2	*Centre-based*	34	85.1 (16.0)	31	86.2 (14.4)	14	90.9 (13.4)	79	86.6 (14.9)	2.01	.368
3	*Total*	90	82.9 (14.9)[a]	65	85.9 (15.0)	20	94.5 (14.1)[a]	175	85.3 (15.2)	10.37	.005

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] $p < .01$ and [b] $p < .05$). (*) Kruskal-Wallis Exact Test, Monte Carlo Method

Specifically, the IQ and VQ of children in home-based care increased as a function of maternal education (Table 2, Row 1 and Table 3, Row 1 respectively), whereas those of children who attended day care did not vary with maternal education (Table 2, Row 2 and Table 3, Row 2 respectively).

3.4 Joint effect of type of care and parental origin

Given that maternal education affected children's cognitive and linguistic outcomes, we conducted a separate analysis to ensure that the educational level of mothers in native, mixed and foreign-born couples did not significantly differ (Kruskal-Wallis Exact Test, Monte Carlo Method, $\chi^2 = .34$, $p = .853$).

Type of care partly interacted with parental origin: cognitive outcomes did not vary as a function of parental origin among children who had been in home-based versus centre-based care in early childhood (Table 4, Rows 1 and 2), whereas differences emerged in relation to VQ.

Table 4. Mean (SD) IQ scores by type of care and parental origin

		Parental origins									
		1		*2*		*3*		*4*			
		Both native		*One foreign*		*Two foreign*		*Total*		*χ^2 (*)*	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	71	99.8 (13.4)	12	96.3 (15.9)	13	98.5 (11.0)	96	99.2 (13.3)	.28	.871
2	*Centre-based*	58	102.9 (14.3)	12	95.2 (9.0)	7	92.4 (13.5)	77	100.8 (14.0)	4.97	.079
3	*Total*	129	101.2 (13.9)	24	95.7 (12.6)	20	96.4 (11.9)	173	99.9 (13.6)	4.19	.123

(*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Specifically, children with two foreign parents who had attended day care displayed significantly lower receptive language ability than children with two native or "mixed" parents (Table 5, Row 1 and 2).

3.5 Differences from preschool to school age

We repeated all the analyses conducted on the total sample data, on the two subgroups of pre-schoolers and primary school students, to verify whether the effects varied as a function of children's age. We only report the results that differed from those of the overall sample.

Table 5. Mean (SD) VQ by type of care and parental origins

		Parental origins									
		1		*2*		*3*		*4*			
		Both native		*One foreign*		*Two foreign*		*Total*		χ^2 *(*)*	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	71	84.7 (16.2)	12	85.3 (14.9)	13	81.5 (12.1)	96	84.3 (15.4)	1.18	.559
2	*Centre-based*	58	87.3 (15.1)[a]	12	89.6 (14.9)	7	73.7 (9.4)[a]	77	86.5 (15.1)	6.37	.038
3	*Total*	129	85.9 (15.7)	24	87.4 (14.7)	20	78.8 (11.6)	173	85.3 (15.3)	4.09	.129

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] $p < .05$. (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Maternal education only affected choice of type of care in the preschooler subsample: 61.5% of mothers with lower secondary education and 50.0% with upper secondary education had chosen home-based care for their children's early years, whereas 81.8% of university-educated mothers had opted for centre-based care (Kruskal-Wallis Exact Test, Monte Carlo Method, $\chi^2 = 6.42$, $p < .05$). In the primary student subsample, a similar trend emerged: mothers with lower secondary education or upper secondary education were more likely to have chosen home-based care (62.7% and 57.1% respectively), whereas higher educated mothers were more likely to have opted for centre-based care (55.6%), but these differences were not significant (Kruskal-Wallis Exact Test, Monte Carlo Method, $\chi^2 = 1.10$, $p = .595$).

The effect of maternal education on both cognitive and linguistic outcomes detected in the total sample, was present for preschoolers but not for primary students (Table 6s and 7).

Table 6. Mean (SD) IQ scores by age group and maternal education

		Maternal education									
		1		*2*		*3*		*4*			
		Lower secondary		*Upper secondary*		*Higher education*		*Total*		χ^2 (*)	*p*
	Sample	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Pre-schoolers*	39	99.4 (12.5)[b]	44	99.7 (11.4)[c]	111	112.6 (12.5)[b, c]	94	101.1 (12.5)	11.00	.004
2	*Pupils*	51	95.4 (13.0)	21	101.6 (15.3)	9	107.4 (17.4)	81	98.4 (14.6)	4.80	.089
3	*Total*	90	97.2 (12.9)[a]	65	100.3 (12.7)[b]	20	110.3 (14.5)[a, b]	175	99.8 (13.5)	13.63	.001

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] $p < .05$. (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Table 7. Mean (SD) VQ scores by age group and maternal education

		Maternal education									
		1		*2*		*3*		*4*			
		Lower secondary		*Upper secondary*		*Higher education*		*Total*		χ^2 (*)	*p*
	Sample	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Pre-schoolers*	39	76.6 (12.6)[b]	44	81.9 (11.9)	11	90.2 (13.1)[b]	94	80.7 (12.9)	11.61	.002
2	*Pupils*	51	87.6 (14.8)	21	94.3 (17.6)	9	99.7 (14.2)	81	90.7 (15.9)	5.37	.068
3	*Total*	90	82.9 (14.9)[a]	65	85.9 (15.0)	20	94.5 (14.1)[a]	175	85.3 (15.2)	10.37	.004

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] $p < .005$ and [b] $p < .01$). (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Nevertheless, in relation to IQ only, the cognitive scores of primary students who had been in home-based care were positively associated with higher maternal education (Table 8, Row 1), whereas those of primary school children who had received centre-based care were not. More specifically, while the Kruskall-Wallis test identified a significant effect of maternal education, the Mann-Whitney test did not indicate any significant difference between the sub-groups (Table 8, Row 2). The VQ of primary pupils did not differ as a function of maternal education regardless of whether they had received centre-based care home-based early childhood care.

Table 8. Mean (SD) IQ scores of primary students by type of care and maternal education

		Maternal education									
		1		*2*		*3*		*4*			
		Lower secondary		*Upper secondary*		*Higher education*		*Total*		χ^2 (*)	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	32	94.2 (13.3)[a]	12	95.1 (15.0)[b]	4	120.8 (13.2)[a, b]	48	96.6 (15.3)	7.64	.017
2	*Centre-based*	19	97.5 (12.5)	9	110.3 (11.3)	5	96.8 (12.6)	33	96.8 (12.6)	5.84	.047
3	*Total*	51	95.4 (13.0)	21	101.6 (15.3)	9	107.4 (14.6)	81	98.4 (14.6)	4.80	.087

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] p <.05 and [b] p <.05). (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Finally, the pre-schoolers' sample display a pattern of results that was very similar to that of the total sample, with the exception of the joint effect of parental origin and type of care on linguistic outcomes. In relation to the groups of children who were in centre-based care in early childhood, in the total sample the VQ of children with two both native parents was significantly higher than that of children with two foreign-born parents; this also held for the primary student sub-sample (Table 9 and 10), but not for the pre-schooler group (Table 10, Row 1).

Table 9. Pupil's VQ average scores (SD) by type of care and parents' origins

		Parental origins									
		1		*2*		*3*		*4*			
		Both native		*One foreign*		*Two foreign*		*Total*		χ^2 (*)	*p*
	Type of care	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Home-based*	34	89.5 (18.1)	8	92.6 (11.71)	6	85.5 (15.3)	48	89.5 (16.7)	.80	.670
2	*Centre-based*	22	94.9 (13.9)[a]	7	95.7 (12.8)	4	73.0 (10.0)[a]	33	92.4 (14.8)	6.92	.024
3	*Total*	56	91.6 (16.6)	15	94.1 (11.9)	10	80.5 (14.3)	81	90.7 (15.9)	5.21	.075

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] p <.01. (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

Table 10. Mean (SD) VQ scores of children in centre-based care by age group and parental origin

		Parental origins									
		1		*2*		*3*		*4*			
		Both native		*One foreign*		*Two foreign*		*Total*		χ^2 (*)	*p*
	Sample	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*	*N*	*Mean (SD)*		
1	*Pre-schoolers*	36	82.7 (14.1)	5	81.0 (14.5)	3	74.7 (10.5)	44	82.0 (13.9)	.97	.644
2	*Pupils*	22	94.9 (13.9)[a]	7	95.7 (12.8)	4	73.0 (10.0)[a]	33	92.4 (14.8)	9.92	.025
3	*Total*	58	87.3 (15.1)[b]	12	89.6 (14.9)	7	73.7 (9.4)[b]	77	86.5 (15.1)	6.37	.043

The same superscript shows values that are significantly different (Mann-Whitney Exact Test, Monte Carlo Method): [a] p < .01 and [b] p < .05). (*) Kruskal-Wallis Exact Test, Monte Carlo Method.

4. Discussion

The aim of this cross-sectional study was to contribute to the debate about the effects of early childcare, maternal education and parental origin on children's outcomes as observed at pre-school and primary school ages, by analysing preliminary Italian data.

In keeping with the literature, our first and second hypotheses stated that centre-based care would be mainly chosen by highly educated mothers (NICHD ECCRN, 2006) and native parents (De Feyters & Winsler, 2009). The results partly confirmed these hypotheses: in our study, highly educated mothers were more likely to choose centre-based care than were mothers with a lower level education, but this effect was detected in the preschool sample only. In addition, the percentage of foreign-born parents who opted for centre-based care was lower than the percentage of native or mixed parents, although this difference was not significant in either the pre-schooler or the primary student subsamples. It is likely that this finding was influenced by the way in which access to day care is regulated in the city in which the data were collected: specifically, local regulations are designed to facilitate access to public care for families at risk, for example by reducing fees for low-income units. This could be interpreted as an example of an efficient inclusion policy.

Our third hypothesis stated that maternal education would be positively linked to children's outcomes (NICHD ECCRN, 1997; Peisner-Feinberg et al., 2001; Sammons et al., 2004) and this was confirmed for preschoolers only. In the preschoolers' subsample, the VQ of children with university-educated mothers was significantly higher than that of children whose mothers had only completed lower secondary education; the same difference was found for IQ while the children of mothers with a university-level qualification also obtained higher IQ scores than their peers whose mothers had completed upper secondary education. Nevertheless, in the primary students subsample, these differences were not present. Given that the measure of VQ was based on the amount of receptive vocabulary, it is possible that the primary school education process had helped children to fill this gap.

The third hypothesis also stated that centre-based care would have a positive effect on children's outcomes (NICHD ECCRN, 2006; Belsky, Vandell, Burchinal, Clarke-Stewart, McCartney, & Owen, 2007); however, type of care per se was not found to have any effect on either cognitive or linguistic outcomes.

In contrast, when the joint effect of type of care and maternal education was examined in relation to the total sample, we found out that the IQ and VQ of children who had been in home-based care increased with level of maternal education, whereas the IQ and VQ of children who had received centre-based care did not. This result was replicated in relation to the IQ of primary school students who had attended day care facilities in early childhood. Thus, professional care appeared to play a protective role for children with less educated mothers. It should be acknowledged that, in the current study, no information was collected concerning the quality of childcare facilities or parental styles, and our sample contained a relatively small number of children with university-educated mothers. It follows that the results should be interpreted with caution. Nevertheless, these finding suggest a positive effect of centre-based care, which should be taken into account when designing policies for the inclusion of children whose parents are poorly educated.

According to our fourth hypothesis, children with two foreign parents would obtain poorer linguistic outcomes (De Feyters & Winsler, 2009; Sammons et al., 2004). In general, parental origin – with parental couples categorized as *both native*, *mixed* or *both foreign* – did not affect children's linguistic and cognitive outcomes. However, a joint effect of parental origin and type of care emerged in the primary student subsample: specifically, the VQ of children with two foreign parents who had attended day care services in early childhood was significantly lower than the VQ of children with two native or mixed parents. Centre-based care should be designed to help the children of foreign-born parents to acquire the host country language; in the Italian context, while primary school protocols explicitly provide for compensatory action to support L2 learning in foreign children, this is not the case for early education: this deficit should be addressed at a policy level.

In sum, when the single effects of type of care, maternal education and parental origin on children's outcomes were analysed, no differences emerged. On exploration of the interactions among these variables, centre-based care appeared to play a protective role with respect to maternal education: in fact, differences due to maternal education – in terms of both verbal and cognitive performance – were evident in children who had received their early care exclusively in the home, but not in children whose early care had been centre-based, in respect to both. On the contrary, home-based care appeared to play a protective role with respect to parental origins: the linguistic performance of children with two foreign parents was more advanced if they had been cared for at home during their early years.

Our study displays some limitations. The of pre-schooler and primary pupil subsamples may have been exposed to a cohort effect and actually differed in terms of the distribution of maternal education and of mean VQ. Moreover, the data concerning the type of early care received was collected retrospectively. Future research should also take into account the quality of care, by collecting indicators of both parental interactional style and day care organization.

Our study could help to inform policy planning and implementation in the Italian context: it seems crucial to design educational intervention and train professionals to better support children's linguistic development from the early years of life and day-care and nursery schools are the best candidates for providing such support. Children with two foreign parents stand to gain the most from this kind of targeted intervention. Moreover, given the positive impact of maternal university education on the outcomes of children cared for at home, it could be of value to reflect on the stimulation that educational services provide as a whole: the esthetical quality of the environment and materials, environmental and organizational features that limit stressful noises and crowding, richness of cultural initiatives, opportunities for the child to interact freely and independently with the environment and toys autonomously, for instance. Finally, when children have poor linguistic competence it is critical to offer them the opportunity to express themselves through movement, manipulation and artistic expression in order to foster feelings of self-competence.

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