



## **CONTEXTUAL FACTORS IMPACT ON THE CHILD DEVELOPMENT IN EARLY CHILDHOOD: THE ATTENDANCE OF THE PRE-KINDERGARTEN AS AN INCREASING FACTOR THE BASIC VISUAL-MOTOR AND PERCEPTION SKILLS**

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The purpose of this study is to assess how the pre-kindergarten experience can positively affect the development of basic visual-motor integration skills in early childhood. Pre-kindergarten has to be understood as a setting with specific educational purposes that differentiate it from the first educational context in which the child experiences: the family. The envisioned hypothesis is that the experience of pre-kindergarten can improve the neuropsychological development of the sensory-motor and perceptual aspects of visual and spatial integration. The specific objective is to assess the impact of progressed education experiences, within the pre-kindergarten on the development of visual-motor integration skills, comparing the incidence of additional contextual factors, referred to the current preschool experience and the family's characteristics. The project involved 60 children (age range: 4-5 years old, mean: 4.5; sd: 0.5, 38 males, 22 females), 30 with pre-kindergarten experience, 30 without pre-kindergarten experience. To the participants were proposed the VMI (Visual-Motor Integration) test; an ad-hoc questionnaire related to socio-anagraphical data was handed over to the families. The analysis carried out (Mann-Whitney for independent samples) showed significant results ( $p < 0.05$ ) in relation to the influence of previous experience of pre-kindergarten.

### **INTRODUCTION**

Pre-kindergarten is one of the earliest experiences of care and socialisation outside of the original family unit (Care et al., 2001; Johnson et al., 2011); . This kind of educational service was initially established to deal with the new socio-economic demands posed by the entry of women into the workplace, and over the last few years has gradually become structured as an educational setting in its own right, with its own characteristics. In terms of developmental systems, today, pre-kindergarten can be described as an educational micro-context (Bronfenbrenner, 1979) that structures the first interactions of the child, as an important alternative (and complement) to the family in terms of the provision of early socialisation experiences (Weigel et al., 2005). Given the "situat-



## THE ATTENDANCE OF THE PRE-KINDERGARTEN AS AN INCREASING FACTOR THE BASIC VISUAL-MOTOR AND PERCEPTION SKILLS

ed” nature of the developmental and learning experience (Rogoff, 1990), it clearly emerges that pre-kindergarten provides children with an important incentive for developing social skills. In this context, these skills refer to secondary socialisation processes, where a simultaneous and daily exposure to adults and peers takes place (Bondioli, Mantovani, 1997; Emiliani, 1987, 2002). The pre-kindergarten experience thus constitutes an important incentivising factor for the development of social and relational skills. Furthermore, the facilitating effect of the pre-school experience on the development of language and cognitive skills has also been demonstrated (Varin, 2007). Hence inclusion in pre-kindergarten is an experience that can enhance socio-cognitive, linguistic and relational development. In social, cognitive and linguistic terms, the learning of fundamental skills finds a formal educational setting in the pre-kindergarten context, which is capable of incentivising their development and consolidation. Indeed, pre-kindergarten is understood here as a setting with specific educational intentionality positioned within a formal framework of meanings which sets it apart from the first educational context that the child experiences, that is, the family.

In this study, we intend to focus particularly on the processes of neuropsychological development of the first years of life: the interest in this specific aspect is based on the important role played by attentional, perceptual and sensory-motor processes in the intellectual development of the child in early infancy. The educational context thus provides a framework within which the potentials already present in the psycho-neurological development of the child are fully realised. The reference adopted here is to the influences of the micro-context that the child may experience in the early stages of its development: influences from the family and pre-school influences. The starting assumption thus involves considering the educational micro-context not merely as a “background”, which may well incentivise development of skills, but these are exclusively social and relational skills; rather the micro-context is taken to be a “framework of meaning” (Bruner, 1990) which, through the specific nature of the experiences it offers, is able to boost the development of basic neuropsychological skills and fundamental cognitive skills, which are transversal to the processes of learning (principally logic, attention and memorising skills).

The aim of this study is to assess to how attendance of pre-kindergarten in early infancy affects, in educational terms, the neuropsychological development of the child. The hypothesis is that the pre-kindergarten experience increases the development of basic neuropsychological skills, in relation to sensory-motor and perceptual aspects of visual and spatial integration, more effectively than educational experiences in other micro-contexts typical of the early educational and social experiences of early infancy (pre-school and family contextual factors). The specific objective is hence to verify the incidence of previous pre-kindergarten educational experience on the development of visual and motor integration skills, with a comparison with the incidence of other contextual factors related to the current pre-school experience and the family unit of origin. In particular the study aims: I. To verify the incidence of contextual variables related to the pre-kindergarten experience (previous pre-kindergarten experience; current weekly attendance - part time Vs. full time) on the development of visual and motor integration skills; II. To verify the incidence of contextual variables relating to the family (presence of siblings in the family unit; separated parents) on the development of visual and motor integration skills; III. To compare the incidence of these contextual factors (pre-school vs. family) on the development of visual and motor integration skills.

## METHOD

### Participants

The study involved 60 children, all attending kindergarten, with an average age of 4.5 (*range*: 4-5 years; *SD*: 0.5); 38 boys, 22 girls. Of these, 30 children had attended pre-kindergarten in the first



## DESAFÍOS Y PERSPECTIVAS ACTUALES DE LA PSICOLOGÍA EN EL MUNDO DE LA INFANCIA

three years of life; 30 had no previous pre-school experience. The participants were contacted as attendees – either full-time or part-time – of pre-kindergarten in Piedmont (northwest Italy); all children were Italian and there were no cases of disability.

### Procedure

The study initially involved asking for socio-demographic details using a specially-designed questionnaire presented to the children's families. Next, the participants were put through the Italian adaptation of the VMI (Visual-Motor Integration) Test. The statistical analyses were carried out using the PASW Statistics 18 software.

### Instruments

The Developmental Test of Visual-Motor Integration (Beery, Buktenica, 2000) aims to assess how individuals are able to integrate visual and motor input, with coherent activation of basic neuropsychological visual-motor integration skills. This test was developed for studies conducted by the authors on the geometric figure copying skills of children. Indeed, significant correlations were found (Leton, 1963; Lowder, 1956) between the ability to correctly reproduce the proposed figures and individual school performance levels. The theoretical basis for this analysis was principally the typical theses of *Gestaltism* (Wertheimer, 1923; Werner, 1957), and on the diagnostic associations made in clinical settings between spontaneous graphic production in children and the existence of neurological issues (Bender, 1938; Kellogg, 1970). Another fundamental reference came from the studies proposing a sensory-motor origin to intellectual and learning processes (Piaget, 1952; Bruner, 1964), which explains the highest levels of cognitive processing as relating to the development of increasingly sophisticated integration skills between the receipt of sensory information and activation of motor sequences. The first version of the test, which was published in 1964 and known at the time as the *Developmental Form Sequence*, was followed by the current VMI published in 1967. In its complete form (used for this study, it consists of 27 items involving the copying of various geometric shapes, proposed with increasing complexity. Performance of the test gives rise to a total raw score, which can be converted into a standard score. The complete form of test can be administered from the age of 3 up to adulthood.

## RESULTS

### *1. Correlations between contextual-preschool variables and the development of basic neurological skills*

Following are the results for the influence exerted by contextual-school variables on the enhancement of the development of visual-motor integration skills. Specifically, previous pre-school experience (attendance of pre-kindergarten in the first three years of life), and the current type of school experience (full-time daily – 8h, Mon-Fri - Vs part-time - 4 h daily Mon-Fri).

### *1. Correlation between pre-kindergarten experience and the development of visual-motor integration skills*

Table shows the distribution of the VMI scores (raw and standard) for the entire group of participants, for the two subgroups of children who had previously attended a pre-kindergarten school and children who had had no pre-school experience in the first three years of life. The distributions show higher performances in the group of children with previous attendance of pre-kindergarten: the average raw scores, like the standard scores were lower in the first group, with a deviation of + 1.77 for raw scores and + 9.53 for standard scores. To assess the significance of the correlation, the Mann Whitney non-parametric test was used on independent samples, for which the results are



**THE ATTENDANCE OF THE PRE-KINDERGARTEN AS AN INCREASING FACTOR THE BASIC VISUAL-MOTOR AND PERCEPTION SKILLS**

shown in table 2. The normality of the distribution also enabled us to assess the significance of this correlation using the ANOVA Oneway test (results in table 3). In both tests, the correlation was significant for the distributions of standard scores (shown in table 1). The mean VMI standard scores were significantly higher in the group of children who had attended pre-kindergarten in the past. The previous pre-school experience seems thus to have incentivised the development of more sophisticated visual and motor integration skills, significantly more than educational experience received within the family alone. Graph 1 summarises effectively the features of the distributions analysed (VMI Std.): the distribution of scores in the group of children who had attended pre-kindergarten falls within a wider range, which has both minimum and maximum levels greater than the corresponding scores taken in the control group.

Table 1: Distributions of VMI scores for the overall group, and subgroups related to previous attendance of pre-kindergarten

	Whole group	Group 1*	Group 2**
VMI - mean raw scores	9.88	10.27	9.50
VMI - sd raw scores	3.34	5.50	3.19
VMI - raw score range	3-15	4-15	3-15
VMI - mean std scores	95.88	100.60	91.17
VMI - sd std scores	17.26	17.36	16.09
VMI - std score range	66-128	72-128	66-116

\*Previous attendance of pre-kindergarten

\*\* No previous attendance of pre-kindergarten

Mann-Whitney Test on the VMI score distributions in both groups. Significance values (*=p<0.05)	
VMI – raw score	.292
VMI – std score	<b>.047*</b>

Table 2

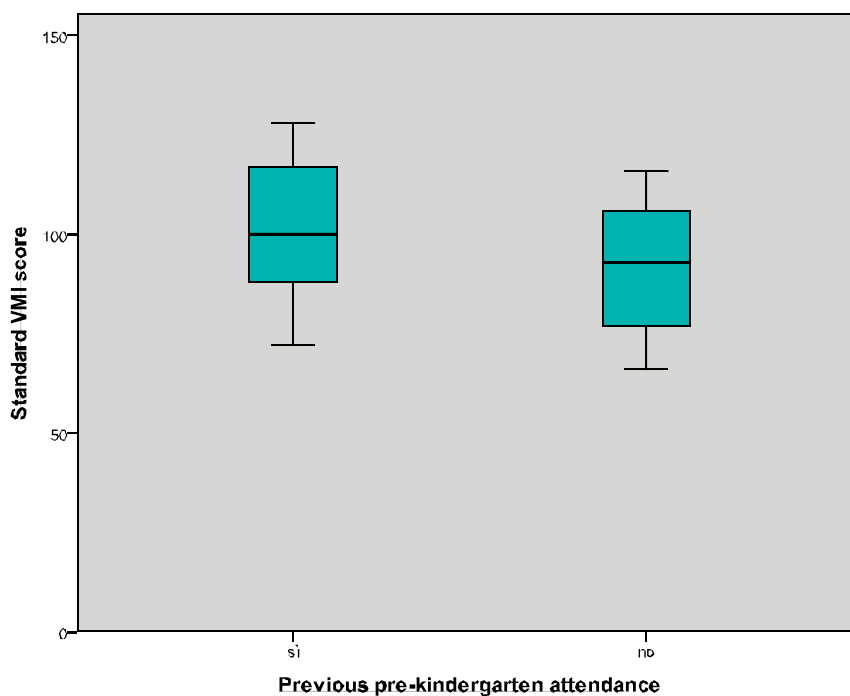
ANOVA Oneway Test; VMI score distributions in the two groups (*=p<0.05)		
	F	Sig.
VMI – raw score	.785	.379
VMI – std score	4.763	<b>.033*</b>

Table 3



DESAFÍOS Y PERSPECTIVAS ACTUALES DE LA PSICOLOGÍA EN EL MUNDO DE LA INFANCIA

Graph 1



2. Correlations between school attendance time and the development of visual-motor integration skills

Another school-based contextual variable was the type of school attendance time of kindergarten. The options were summarised as full-time (40 hours a week) and part-time (20 hours a week). The mean VMI scores (table 4) was greater in the children who currently attend kindergarten part-time (20 hours). However an assessment using the Mann Whitney test for independent samples (table 5) reveals that there is no significant correlation between the distribution of VMI performance and the type of school attendance time chosen.

Table 4: Distributions of VMI scores on the overall group, and subgroups related to current school attendance time

	General sample	Group 1*	Group 2**
VMI - mean raw scores	9.88	9.71	10.89
VMI - sd raw scores	3.34	3.49	2.20
VMI - raw score range	3-15	3-15	8-14
VMI - mean std scores	95.88	95.04	100.67
VMI - sd std scores	17.26	17.94	12.51
VMI - std score range	66-128	66-128	83-117

\* Full-time attendance

\*\* Part-time attendance

**THE ATTENDANCE OF THE PRE-KINDERGARTEN AS AN INCREASING FACTOR THE BASIC VISUAL-MOTOR AND PERCEPTION SKILLS**

Table 5

Mann-Whitney Test on the VMI score distributions in both groups. Significance values (*= $p < 0.05$ )	
VMI – raw score	.400
VMI – std score	.372

*II. Correlations between contextual-family variables and the development of basic neurological skills*

The variables relating to the family context are investigated here in terms of two factors: the presence of siblings in the family unit and parent separation.

*1. Correlations between family variables (presence of siblings) and the development of basic visual-motor skills*

The group of children who had one or more siblings (table 6) has higher values than the group of only children, in terms of both raw scores and standard scores. In the first group, the range was wider overall, and the distribution for raw scores and standard scores showed greater variability. However these trends were not significant (table 7). The normality of the distributions also enabled us to assess the hypothesis using the ANOVA Oneway test (table 8). In this case, too, no significance was seen, although the value of  $p$  can be considered to be at the limit.

Table 6: Distributions of VMI scores for the whole group, and subgroups related to the presence of siblings in the family unit

	Whole group	Group 1*	Group 2**
VMI - mean raw scores	9.88	10.42	8.80
VMI - sd raw scores	3.34	3.81	3.07
VMI - raw score range	3-15	3-15	4-14
VMI - mean std scores	95.88	98.82	90.00
VMI - sd std scores	17.26	17.68	15.14
VMI - std score range	66-128	66-128	67-128

\* Presence of siblings

\*\* Only children

Table 7

Mann-Whitney Test on the VMI score distributions in both groups. Significance values (*= $p < 0.05$ )	
VMI – raw score	.058
VMI – std score	.051



DESAFÍOS Y PERSPECTIVAS ACTUALES DE LA PSICOLOGÍA EN EL MUNDO DE LA INFANCIA

Table 8

ANOVA Oneway Test; VMI score distributions in both groups (*= $p < 0.05$ )		
	F	Sig.
VMI – raw score	3.267	.076
VMI – std score	3.639	.061

2. Correlations between family variables (separated parents) and the development of basic visual-motor skills

A further factor considered for family context factors was the presence of separated parents. Table 9 shows the distributions in the two subgroups: children with separated parents have slightly lower scores than children whose parents are not separated. However this trend was not significant (table 10).

Table 9: Distributions of VMI scores for the whole group, and subgroups related to the presence of separated parents

	General sample	Group 1*	Group 2**
VMI - mean raw scores	9.88	9.80	9.90
VMI - sd raw scores	3.34	3.12	3.42
VMI - raw score range	3-15	6-15	3-15
VMI - mean std scores	95.88	95.50	95.96
VMI - sd std scores	17.26	17.84	17.33
VMI - std score range	66-128	67-128	66-128

\* Separated parents

\*\* Parents not separated

Table 10

Mann-Withney Test on the VMI score distributions in both groups. Significance values (*= $p < 0.05$ )	
VMI – raw score	.796
VMI – std score	.850

**DISCUSSION/CONCLUSION**

Pre-kindergarten experience was a fundamental factor incentivising the development of basic neuropsychological factors, which here were considered in relation to visual and motor integration skills. Attendance in the first three years of life of a formal educational context (pre-kindergarten) appears to be significantly correlated to the development of better visual-motor integration skills. In



## THE ATTENDANCE OF THE PRE-KINDERGARTEN AS AN INCREASING FACTOR THE BASIC VISUAL-MOTOR AND PERCEPTION SKILLS

other words, the pre-kindergarten experience offers children an opportunity for development that is significantly more effective than both future pre-school experience and early experiences of primary socialisation provided by the family of origin. Of the various contextual factors examined (pre-school and family), attendance of a pre-kindergarten emerges as the only truly discriminating factor for the development of visual-motor integration skills significantly higher than the control group mean.

The pre-kindergarten experience might also be a protective factor against possible future development of learning difficulties. Low levels of basic neuropsychological skills, including visual and motor integration skills, are in fact, in diagnostic terms, related (cit.) to the development of cognitive and learning problems. Early attendance of a formal educational setting might thus play a double role in child development: on one hand, as an educational micro-context capable of enhancing development in the short term of visual-motor integration skills. On the other hand, it may be an important protection factor in the long-term against the onset of cognitive- and learning-related problems. This last aspect calls for further investigation of the basic theses characterising the hypotheses on which this study is based.

At the same time, results of this kind call for a deeper examination of the specification of the contextual factors examined, particularly with regard to those correlations whose values were close to the significant limits. Here we are referring to the correlation between VMI scores and presence of siblings in the household. These family-based contextual factors deserve further investigation as they are important variables in how primary socialisation processes are achieved. On the whole, it is surprising that pre-school variables are not uniform: given current attendance (in the 3-6 age range) of a pre-school experience (kindergarten) the discriminating factor is not the type of school attendance time, but rather previous experience of pre-kindergarten.

Thus, it appears again that the first three years of life are an essential point in the child's development, capable of influencing new skills, both in the short term and in the long term.

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DESAFÍOS Y PERSPECTIVAS ACTUALES DE LA PSICOLOGÍA EN EL MUNDO DE LA INFANCIA

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