FOLLOW-UP OF THE CHILD'S MOTOR ABILITIES IN DAY-CARE CENTERS AND PRE-SCHOOLS[1]

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The aim was to describe the results of a developmental screening test in a cohort of 30 children attending 3 day-care centers in the city of São Paulo and develop hypotheses about these results. Thirty children were evaluated three times, during two years, by using the DDST. In the gross motor area the results improved (Tests of the Signs, 1st to the 3rd evaluation, p= 0.038). There was a relationship between the age of the child (2 to 3 years) and worst results (Fisher's Exact test, p= 0.013*). In the fine motor area the results improved (Tests of the Signs, 1st to the 2nd evaluation, p= 0.031*). So, the development of motor abilities improved after the children started attending the day-care centers. We must undertake more researches in order to attribute the specific influences of each area: day-care center and/or family.*

DESCRIPTORS: child day care centers; child care; child development

ACOMPAÑAMIENTO DE LAS HABILIDADES MOTORAS DE NIÑOS QUE FRECUENTAN JARDINES INFANTILES

El objetivo fue describir los resultados de las selecciones del desarrollo motriz de un grupo de niños que frecuenta tres (3) jardines infantiles de la ciudad de San Pablo y levantar hipótesis a respecto de estos resultados. Treinta niños fueron evaluados tres veces, a lo largo de dos años, utilizando el Test de Selección de Desarrollo de Denver II. En el área motora gruesa los resultados mejoraron (Test de las Señales, 1a. para 3a. aplicación, p= 0,038). Hubo relación entre la edad de los niños (2 a 3 años) y peores resultados (Test exacto de Fisher, p= 0,013*) En el área motora fina los resultados mejoraron (Test de las Señales, 1a. para 2a. aplicación, p= 0,031*) El desarrollo motriz mejoró después que los niños comenzaron a frecuentar los jardines infantiles. Son necesarias más investigaciones a fin de atribuir influencias específicas para cada área: jardines infantiles y/o familia.*

DESCRIPTORES: jardines infantiles; cuidado del niño; desarrollo infantil

ACOMPANHAMENTO DAS HABILIDADES MOTORAS DE CRIANÇAS QUE FREQÜENTAM CRECHES E PRÉ-ESCOLAS

O objetivo foi descrever os resultados de triagens do desenvolvimento motor de uma coorte de crianças que freqüenta 3 creches da cidade de São Paulo e levantar hipóteses a respeito destes resultados. Trinta crianças foram avaliadas três vezes, ao longo de dois anos, usando-se o Teste de Triagem de Desenvolvimento de Denver II. Na área motora grossa os resultados melhoraram (Teste dos Sinais, 1ª para 3ª aplicação, p= 0,038). Houve relação entre idade da criança (2 a 3 anos) e piores resultados (Teste exato de Fisher, p= 0,013*). Na área motora fina os resultados melhoraram (Teste dos Sinais, 1ª para 2ª aplicação, p= 0,031*). O desenvolvimento motor melhorou depois que as crianças começaram a freqüentar as creches. São necessárias mais pesquisas a fim de atribuir influências específicas a cada área: creche e/ou família.*

DESCRITORES: creches; cuidado da criança; desenvolvimento infantil

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INTRODUCTION

Infantile development occurs with the progressive incorporation of ideas, attitudes, abilities and behaviors and depends on the full occurrence of many factors. These factors are related to the child's development, its genetic constitution, physical, social and cultural environment in which it is inserted. An example of the interaction amongst these components occurs when the child of almost one year and four months old learns how to drink water from a glass. To acquire this behavior it needs to sit, to hold the glass and coordinate the movement so as not to spill anything. Moreover, the child needs to be in an environment where the practice of offering water in a glass is more common than in a nursing bottle or in a glass with a straw.

Considering the complexity of factors that the child needs to develop, there is a need to periodically evaluate it, to institute actions unexpectedly needed. It is called "infantile development supervision", a health action recommended by national and international institutions[1-3]. This action is needed in day care centers and preschools since these institutions, in Brazil, assist a greater number of children. In 2003, 766,914 Brazilian children up to the age of three years were being assisted in day-care centers. The increase in relation to 2002 is 7.02%. In São Paulo, the difference is even greater: the State reports 19% more students in day-care centers than in 2003[4]. It is worth emphasizing that day-care centers assist children from 0 to 3 years old and pre-school from four to six years old.

Among the different purposes and goals that day-care centers and pre-schools must reach, according to the Brazilian Curriculum Referential for Infantile Education[5], there are many associated to the four areas of infantile development: social personal, gross and fine motor abilities and language abilities.

Regarding fine motor area, children are expected to have the opportunity to explore and use prehensile movements, to hold and to throw when using different objects. And regarding gross motor abilities, the environment must be organized in a way children will be able to develop abilities to move with progressive skill in space when walking, running, jumping, developing a self-confident attitude regarding their own body.

In spite of its importance, developmental supervision has been performed only occasionally in most of day-care centers and Brazilian preschools according to the bibliography and our experience. It must be pointed out that, in Brazil, there are no longitudinal studies of the infantile development in day-care centers and pre-school, although some professionals of the nursing area (isolated or in groups) have carried out some studies related to this subject[6-10], this because supervision of infantile development belongs to child health care[1-3].

OBJECTIVE

To describe and develop hypotheses of the results of a development screening of motor abilities in a child cohort enrolled in three high-quality standard day-care centers.

METHODOLOGY

Scenario of the study

The selected day-care centers are closely located to each other in the city of São Paulo and are considered of high-quality standard assistance regarding their structural situation (size of the classrooms and adult/child ratio). Only the children of the employees that work at the institution use them.

Sample group

Children were evaluated from the moment they started going regularly to the day-care centers in 2001. Three evaluations of 30 children had already been performed (17 boys and 13 girls). Ages ranged from 4 months up to 2 years and 4 months in the first evaluation, from 10 months to 2 years and 10 months in the 2nd evaluation and from 2 to 4 years in the 3rd evaluation. Thus, the interval between the two first evaluations was of almost six months and from the 2nd and the 3rd of approximately one year. These children stayed in the day-care center from 8 to 12 hours per day.

Requirements to form the first sample group were: known gestational age (for those under two years old); absence of any congenital malformation; no previous stay in a day-care center.

Analysis of the socioeconomic status

Socioeconomic evaluation was assessed by using another research that had been done with the group[11] in which was included the fathers' or mothers' salaries.

Evaluation Method: Denver Development Screening Test

The DDST was used to screen development problems. It may be applied to children from birth up to the age of six years[12]. This consists of 125 items, distributed into four areas: social-personal, adaptive fine-motor, language and gross-motor. Some items are applied by asking the child to perform some specific tasks or by means of the parents' or child's caregivers/educators reports.

The gross motor area of DDST consists of 32 items related to behavior such as: sitting without any support, walking properly, running and climbing stairs. The fine motor area consists of 29 items, as: drawing spontaneously and building towers with small building blocks.

A previous preparation of the individual who will apply the test is needed so that each item as well as the full test must be standardized and correctly applied and interpreted.

DDST application[12]

Previous to the test application, the age of the child is calculated on the day the test is performed. Next, a vertical line is drawn corresponding to the age. In this study, the items crossed by the line were applied together with the other three at the left, in each development area to detect if some delay was observed.

Transitory factors of exclusion such as sleep, fatigue, sickness, fever or fear were considered. If the child presented some of these, we waited for its recovery, which could last several days. During the test, if the child felt tired or had to participate in some expected activity in the day care center, the test was interrupted. Other information on the DDST is detailed in other study[13].

For this research every item of the DDST was interpreted as: normal, caution or delay.

Normal: when the child performs one item which is crossed by the age line, or when the child fails or refuses to perform an item, which is to the extreme right of the age line.

Caution: when the child fails or refuses to perform an item in which the age line crosses between 75% and 90%.

Delay: when the child fails or refuses that which is to the extreme left of the age line.

After interpreting each item or behavior, the test, as a whole, may present two types of results:

Normal: where there are no *delays* and at a maximum of one *suspect*.

Suspect: when there are two or more *suspects* and/or more *delays*.

In this study, the test was completely applied; interpretation was performed in general and followed by interpretation of the isolated areas (personal-social, language, fine motor and gross motor). Each area was considered adequate when the child had no *suspect* and/or *delays*.

When the result of the test was *suspect*, a new evaluation was performed within one or two weeks.

Methodology and analysis of ethical cares

Analysis was performed with non-parametric tests[14], assuming the alpha risk of 5% and each child was compared to itself, during the 3 evaluations.

The research respected mandatory ethics efforts according to Brazilian legislation. It indicates that the project was approved by an Ethics Committee, in this case the Ethics Committee of the Nursing School of University of São Paulo (registration numbers 136/2001, 248/2002 and 310/2003).

The director of each institution permitted the research. So did those responsible for the children. They were informed about the work and asked to express their agreement. If they did so, they signed a Free and Clean Term of Consent, according to Resolution nr. 196/1996 of the National Health Council.

RESULTS AND DISCUSSION

Socioeconomic evaluation

In the year of 2004 22.5 % of the parents earned 2.31 to 3.84 minimum wages (MW)[11], and these parents were the poorest of all. Furthermore, according to this study 49.7 % of the parents earned 3.85 to 5.76 MW. The other 27.8 % earned from 5.77 to 26.91 MW. These amounts didn't comprehend other kinds of aids (financial subsidies such as transportation and meals), nor the spouses' salaries. The average of these salaries was 7.60 MW, so it was better than the average salary in the metropolitan region of the city of São Paulo at the same time, which was 4.28 MW[15].

Evaluation of development

Gross motor area

In the gross motor area, children present the results shown in Table 1.

Table 1 – Results of child's evaluation regarding gross motor area of children from 3 day care centers. São Paulo 2001-2003

Evaluation	Adequate		Caution(s)		Delay(s)		Caution(s)+Delay(s)l		Total	
	nr.	%	nr.	%	nr.	%	nr.	%	nr.	%
1st(2001)	17	56.60	7	23.40	2	6.60	4	13.40	30	100.0
2nd(2001)	23	76.60	6	20.00	1	3.40	0	00.00	30	100.0
3rd(2002-2003)	24	80.00	6	20.00	0	0.00	0	00.00	30	100.0

It was observed that children improved after starting to attend day care center. The number of inadequacies diminished as time went by, in the 1st. there were 43.3 % cautions and/or delays, in the 2nd. 23.3 % and in the 3rd. 20 %. It is important to emphasize that in the 1st child's evaluation, children were attending the day-care center approximately two months before and in the 3rd, almost 1 year and 6 months before.

Considering each child's development, comparisons were performed between the 1st and 2nd evaluations, between the 2nd and 3rd and, finally between the 1st and 3rd. When development was maintained, it was considered as a "tie"; when there was a change from caution and/or delay to adequate, a positive sign was introduced and if the opposite occurred, a negative sign was considered (Table 2). The results were evaluated by the Test of Signs with a significant (p= 0.038) improvement when comparing the 1st with the 3rd evaluation, that is, in this area, children's development increased as time of stay increased.

Table 2 – Comparison of the evaluation results regarding gross motor area by the DDST II. São Paulo, 2001-2003

Child	1→2	2→3	1→3
1	+	Tie	+
2	+	Tie	+
3	Tie	Tie	Tie
4	+	Tie	+
5	Tie	Tie	Tie
6	+	Tie	+
7	Tie	Tie	Tie
8	Tie	Tie	Tie
9	-	+	+
10	-	+	Tie
11	Tie	+	+
12	Tie	+	+
13	+	Tie	+
14	Tie	Tie	Tie
15	+	-	+
16	Tie	-	-
17	Tie	-	-
18	Tie	-	-
19	+	Tie	+
20	Tie	-	-
21	+	-	Tie
22	Tie	Tie	Tie
23	+	+	+
24	Tie	Tie	Tie
25	-	+	Tie
26	-	+	Tie
27	Tie	Tie	Tie
28	Tie	Tie	Tie
29	+	Tie	+
30	Tie	Tie	Tie

Tests of the signs
1 → 2P= 0.090 no significant
2 → 3P= 0.500 no significant
1 → 3P= 0.038 significant

Consequently, it is believed that the physical areas and the day-care centers' equipment allowed such results since these were not so good when the children started attending them. It is known from research made by an architect, in the city of São Paulo[16], aiming to check how the children used the urban spaces, that children of higher socio-economical conditions have a tendency of using more poorly such places. In general, they mainly used their own rooms for playing. In comparison, families with a lower income used more often open spaces, specially the streets. Thus their opportunities for motor development were better.

It is known that from the age of 2 years, a child initiates the phase of fundamental movements patterns, in which it depends intensely on the surrounding conditions. Thus, "opportunities for practice, encouragement, instruction, and the ecology (setting) of the environment itself, all play important roles in the degree to which fundamental movements patterns develop."[17]

In this way it should be found out which were the conditions in the day-care centers that helped the children. Regarding the available area for children, the three day-care centers have great external and internal areas, safety and toys adequate for the age range. The internal and external areas available to the children measured 11.30, 13.34 e 29.09 m2 in each of the day-care centers. We draw the attention to the fact that there is no consensual figure concerning what could be considered as a bare or indispensable minimum for the adequate infantile development in the gross motor area. We therefore present the previous figures as characteristically descriptive, not analytical.

Children stay outside with free activities for approximately one hour and a half/day, except in rainy days. They play in groups or alone, as they wish.

Besides, the internal spaces of the 3 day-care centers are organized in corner activities such as to favor the infantile development[18-19].

Then, it was observed that children two to three years' old seem to present a greater number of *suspects*. To analyze this hypothesis, we grouped three children's evaluations (Table 3).

Table 3 – The evaluation results of the gross motor area according to age. São Paulo, 2001-2003

Age evaluation	4 mo. to 1 yr. 11 mo. 29 d. + 3 to 4 years		2 yr. to 2 yr. 11 mo. 29 d		Total
	nr.	%	nr.	%	
Adequate evaluation	45	80.36	19	55.88	64
Caution(s) and/or Delay(s)	11	19.64	15	44.12	26
Total	56	100.00	34	100.00	90

Fisher's Exact test
P= 0.013 significant

Of the 34 (100%) evaluations of children with ages ranging from two to three years, 15 (44.12%) were caution and/or delay. In the other age ranges, only 11 (19.64%) of the 56 (100%) were considered not adequate, which was significant (p= 0.013), that is, there is a relationship between age of the child and caution and/or delay.

We therefore start analyzing behaviors in which the child presented caution and/or delays. Of the 15 children with *suspects*, 14 (93.33%) were not considered adequate in the item "throwing the ball". According to the manual, to apply the DDST[12] and to go to the next item "throwing the ball", the child has to throw the tennis ball directly above the arm and to reach a distance from the ground between the examiner's knees and head without forming an arch. The child is not supposed to throw the ball sideways or down. First, the examiner shows how to do it and after, he/she takes a position approximately 90 cm away from the child and in front of it. Three attempts are permitted and if the child manages to throw at least one, it goes to the next item. According to the manual, 75% performed this item at the age of 23 months and 24 days and 90% with 2 years, 10 months and 24 days.

We believe that this event occurred due to the fact that both the tennis ball and the usage of one's own hands are not so common in environments such as football, for example. Thus, the child is exposed to a lesser number of situations favoring a development of the ability of throwing a ball, which interferes in its acquisition[17].

Regarding sex, the results were divided into boys and girls in the three evaluations and no significant difference was observed when Fisher's Exact Test was performed.

Fine Motor Area

Regarding the fine motor area, children obtained the results shown in Table 4.

Table 4 – Evaluation results of the fine motor area in children of 3 day care centers. São Paulo, 2001-2003

Evaluation	Adequate		Caution		Delay		Total	
	nr.	%	nr.	%	nr.	%	nr.	%
1st (2001)	25	83.34	3	10.00	2	6.66	30	100.00
2nd (2001)	30	100.00	0	0.00	0	0.00	30	100.00
3rd (2002-3)	29	96.66	1	3.34	0	0.00	30	100.00

It was observed that children improved after going regularly to day-care center. The number of children with caution(s), delay(s) and caution(s) + delays(s) decreased with time: in the 1st evaluation there were 16.66 % of cautions and/or delays, in the 2nd, none and in the 3rd, 3.33 %.

Considering each child's development, comparisons between the 1st and 2nd evaluations, between the 2nd and 3rd and, finally between the 1st and 3rd were performed, according to the same criteria used for the gross motor area (Table 5)

Table 5 – Comparison of the evaluation results of the fine motor area using the DDST II. São Paulo, 2001-2003

Child	1→2	2→3	1→3
1	Tie	Tie	Tie
2	Tie	Tie	Tie
3	Tie	Tie	Tie
4	Tie	Tie	Tie
5	Tie	Tie	Tie
6	Tie	Tie	Tie
7	Tie	Tie	Tie
8	Tie	Tie	Tie
9	Tie	Tie	Tie
10	+	Tie	+
11	Tie	Tie	Tie
12	Tie	Tie	Tie
13	Tie	Tie	Tie
14	Tie	Tie	Tie
15	Tie	Tie	Tie
16	Tie	Tie	Tie
17	+	Tie	+
18	Tie	Tie	Tie
19	Tie	Tie	Tie
20	+	Tie	+
21	+	Tie	+
22	Tie	Tie	Tie
23	Tie	Tie	Tie
24	+	Tie	+
25	Tie	Tie	Tie
26	Tie	Tie	Tie
27	Tie	-	-
28	Tie	Tie	Tie
29	Tie	Tie	Tie
30	Tie	Tie	Tie

Tests of the signs
1 → 2P= 0.031 significant
2 → 3P= 1 no significant
1 → 3P= 0.109 no significant

It was observed that in the first months, frequency in the day care center, that is from the 1st to the 2nd evaluation, a statistically significant (p= 0.031) improvement in the fine motor development was observed and in the 3rd evaluation, children maintained their development.

Therefore, supposedly the day-care centers helped the children obtain these results. If it were the opposite, the children would already have arrived in excellent conditions at the day-care centers. We know that the day-care centers have pedagogical and ludic materials in sufficient quality and quantity, besides qualified educators[20]. The interaction itself between the children favors this development. Even so, domestic influence cannot be discarded, within which there is easy access to pedagogical material and which cost is accessible to practically any middle-class family, as well as games and toys whose costs have gone down during the last few years. Notably, in the case of the families of this study, this limitation is practically non-existent, since their income is higher than the average income in the metropolitan region of the city of São Paulo.

Finally, regarding sex, girls and boys presented the same results.

CONCLUSION AND IMPLICATIONS

The development of the children's gross motor improved after they started attending day-care centers, however the results of this task don't allow acknowledging whether this improvement occurred exclusively because of the families, the day-care centers, or both. This research when collated to others, shows that the actual urban conditions, available to children of more favorable socio-economical conditions, can hamper the full development of the gross motor area. In this sense, day-care centers of high quality standards can be a good opportunity for the child to enjoy wide and safe spaces in which to play, besides finding companions of the same age, something which also is uncommon due to the reduction of the number of children and the formation of nuclear families.

The same can be established as regards to the fine motor area. As to these, the children also overcame the eventual difficulties after attending the day-care centers. Nevertheless, the difficulties were lesser than those of the gross motor area and were also speedily overcome (from the 1st to the 2nd. evaluations). It is supposed that this occurred because the families had already supplied a favorable background to the development of these abilities even before the children started attending the centers.

Finally, there are job necessities to delimit the influences referring to families and day-care centers, as well as establishing a pattern of minimum quality in the day-care centers that favor the full development of both gross and fine areas.

Besides this, the DDST has to be analyzed in view of and eventual suitability of items to Brazilian cultural standards. There is a t least one item of the DDST (ball throwing) that may not be adequate to the Brazilian culture, and this must be validated.

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