DENVER II: PROPOSED BEHAVIORS COMPARED TO THOSE OF CHILDREN FROM SÃO PAULO

Denver II: comportamentos propostos comparados aos de crianças paulistanas

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ABSTRACT

Purpose: to verify the proportion of occurrence of behaviors in the areas ("Gross Motor", "Fine Motor-Adaptative", "Personal Social" and "Language") standardized by the Denver II in São Paulo children and associate the proportion of occurrence with sociodemographic variables: age and sex of the child, gestational age, age and parental education. **Methods:** we used records of 150 typical children evaluated by test, we selected three behaviors per area, between 24 and 60 months, with expected occurrence between 50% and 90%. **Result:** most behaviors coincided with proposals with two years and all were observed in the expected proportion. In other ages was greater adaptation of "Gross Motor" area, followed by "Fine Motor-Adaptive", "Language" and "Personal Social". As age increased there was less coincidence of behaviors in "Language" and "Fine Motor-Adaptive". **Conclusion:** the behaviors described in the Denver II were observed in similar proportions in this study, especially in the motor area and the two years following successively three to five years.

KEYWORDS: Child Development; Triage; Child

INTRODUCTION

Children development takes place in the interaction of the physical, psychic and social characteristics of each child [1]. This process is evidenced in changes that begin in intrauterine life and go on involving physical growth, neurological maturation and the construction of cognitive, social and affective abilities[2].

The first childhood is the period of life which goes from zero to five years old, and it is a decisive and irreplaceable phase for the formation of the individual[3]. Development implies changes in the functional organization of the brain, body and individual behavior, as well as in the relationship between the child and his/her experiences organized in social-cultural development[4]. In this way, opportunities offered to children and social expectations can interfere with their development [5].

From the possible risk factors which have influenced the behavioral acquisition of the child, factor related to the specificity of the tasks offered[6], as well as social economic and environmental factors [7]. Due to the importance and the possible impact of the delay in the development of the initial phases in the future condition, it is fundamental that one be able, as early as possible, to identify children at greater risk, referring them to diagnosis and necessary treatment [8].

Trial tests are applicable to a great number of people, fast and at a low cost. These must be ruled by standardized norms which allow to identify risky conditions of alteration in the development and need for later evaluations [9]. Scarcity of standardized and reliable tools to evaluate abilities in the first years of life of Brazilian children [10], added to the lack of performance norms hampers the identification of individuals which would benefit from programs of stimulation as well as it limits the development of researches.

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Developed by Frankenburg el Dodds in 1967, Denver Screening Test may be applied by health professionals with administration of items directly to the child, or questioned to the responsible. The test registers the appearance and the stabilization of each behavior to be observed and allows to notice the area of best performance. The test the objectives to: Provide health professionals with a clinical and organized impression on the global development of the child; alert to the difficulties and evaluate this development based on the performance of a series of proper tasks to the age [11].

Denver Screening Test II (Denver II) is the most recent version, whose main objective is to detect some deviation/alteration of movement, being used to follow all children, at risk or not. The test does not offer a diagnosis and takes the advancement of age into consideration, assessing four areas of development: "Gross Motor Development", "Fine-Adaptive Motor Development", "Social Personal" e "Language".

Denver II is recommended by The Brazilian Society of Pediatrics to follow the children development. It is a tool for integration of a multidisciplinary team, in which each professional may act with his/her specific view. To apply the test, it is necessary to carry out training according to the pre-requisites of the authors. Thus, although it has not been formally standardized to the Brazilian child (it is translated into Portuguese for research ends), it is a test used and recognized internationally, making it necessary, therefore, to investigate the adequacy of the items and pattern of response in each country [12].

With a focus on following the development of children and the adequacy of the behaviors standardized by Denver II, the objectives of this study were: to verify the proportion of occurrence of behaviors in the areas "Gross Motor", "Fine-Adaptive Motor", "Personal Social" and " Language" (standardized by Denver II, in children from São Paulo) and associate this proportion to the social demographic variables: age and gender of child; gestational age; age and parental schooling.

METHODS

Ethical Considerations

This study has had the approval of the Comittee of Ethics and Research of the University of São Paulo – Escola Paulista de Medicina under the number 1200/10.

Participants

The Sample was constituted by 150 records from the archive of the Department of Speech Pathologies of the institution of origin, children from both genders aged between 24 and 60 months, with no complaints of alterations of development, enrolled in municipal pre-school of Southern São Paulo.

These children were evaluated by means of Denver II in a routine of observation of development, without complaints or history of alteration in the development, according to their teachers. The criteria for inclusion of the records were the complete register of the identification of the child and the Denver II form.

Instrument

The instrument of reference adopted in this study was Denver II [11] translated and adapted culturally for the Brazilian child [13]. Denver II evaluates children from zero to six years old and it is composed by 125 items represented by tasks organized in four areas: the "Personal-Social" conduct, which entails aspects of the child's socialization; the "Fine-Adaptive Motor" conduct, which includes eye/hand coordination; the "Gross Motor" conduct, which refers to the body motor control, and the "Language" conduct, which involves the capacity to recognizing, understanding and using language.

In Denver II each item (behavior) is represented by a bar which indicates the age in which 25%, 50%, 75% and 90% of the children can perform a determined behavior. For each item tested a score is attributed (pass, fail, refused, no opportunity) according to the result obtained. Then it is interpreted as: advanced, normal, caution or delay. After this interpretation it may be classified as "Normal", "Questionable" or "Non-Applicable".

Procedure

Data collection:

In this study three specific behaviors have been selected and in each of the four areas of the development presented in Denver II. An item was selected from the 50% occurrence track of behavior in the original standard, and two items between tracks 75 to 90%, a total of 48 target behaviors.

According to this criteria the following items per area were considered: in relation to the Personal-Social area (24 months): takes off clothes, "feeds" a doll, gets dressed under supervision; (36 months) washes and dries hands; says the name of a friend; wears a T-shirt; (48 months) wears a T-shirt; gets dressed without help; plays board games; (60 months): plays board games; brushes teeth without help and prepares meal.

In relation to the area of Language (24 months): names a picture; points six parts of the body; points four pictures; (36 months) recognizes two actions; understands two adjectives; names a color; (48

months) intelligible speech; understands four prepositions; names four colors; (60 months) defines words; understands three adjectives and defines seven words.

In the Fine-Adaptive Motor area: (24 months) 2 cubes tower; 4 cubes tower; 6 cubes tower; (36 months) imitates a vertical line; 8 cubes tower; moves thumb; (48 months) moves thumb; copies circle; draws person (3 parts); (60 months) points the longest line; copies square (demonstrate.); draws person (06 parts).

In Gross-Motor: (24 months) kicks ball; jumps; throws ball; (36 months) jumps; keeps balance on foot 1 sec.; keeps balance in each foot 2 secs.; (48 months) keeps balance in each foot 2 secs.; jumps on one foot; keeps balance in each foot 4 secs.; (60 months) keeps balance in each foot 4 secs.; keeps balance in each foot 5 secs and keeps balance in each foot 6 secs.

Data analysis:

The data was tabled in a spreadsheet and analyzed statistically using software: SPSS V16, Mihitals 15 and Excel Office 2007. Parametric Statistic tests were used: Test of Equality of Two Proportions; Chi-Square Test, ANOVA and Tukey Multiple Comparison. The variables were represented in absolute frequencies (n) and in relative frequencies (%). A level of significance of 0,05(5%) was adopted. All intervals of trust built along the work were constructed with 95% of statistical reliability.

RESULTS

In relation to the characteristics of the sample, 67 records of boys and 83 girls and the division of ages after tabling has presented in a growing order: at two years old, 27 children (13 boys and 14 girls); three years old, 31 children (12 boys and 19 girls); four years old, 44 children (15 boys and 29 girls) and five years old, 48 children (27 boys and 21 girls).

In relation to the characterization of the sample, the distribution of the absolute and relative frequency for each behavior, in the possible answers, for the total of records. This made it possible to notice, then, the most prevalent response and the significant percentage in face of the others (Table 1).

Table 1 – Frequency of scores of behaviors in the Language area

Language	Not investigated		Passed		Failed		No opportunity		Refused	
	N	%	N	%	N	%	N	%	N	%
C20 (02 years old – names a picture)	135	90,0%	15	10,0%	0	0,0%	0	0,0%	0	0,0%
C21 (02 years old – points six parts of the body	134	89,3%	15	10,0%	1	0,7%	0	0,0%	0	0,0%
C22 (02 years old – points four pictures)	130	86,7%	20	13,3%	0	0,0%	0	0,0%	0	0,0%
C25 (03 years old – recognizes two actions)	113	75,3%	35	23,3%	2	1,3%	0	0,0%	0	0,0%
C26 (03 years old – understands two adjectives)	106	70,7%	35	23,3%	5	3,3%	0	0,0%	4	2,7%
C27 (03 years old – names a color)	102	68,0%	37	24,7%	10	6,7%	0	0,0%	1	0,7%
C32 (04 years old – intelligible speech)	69	46,0%	73	48,7%	8	5,3%	0	0,0%	0	0,0%
C33 (04 years old – understands four prepositions)	63	42,0%	64	42,7%	20	13,3%	0	0,0%	3	2,0%
C34 (04 years old – names four colors)	65	43,3%	43	28,7%	40	26,7%	0	0,0%	2	1,3%
C35 (05 years old – defines Five words)	65	43,3%	61	40,7%	21	14,0%	0	0,0%	3	2,0%
C36 (05 years old – understands three adjectives)	49	32,7%	87	58,0%	11	7,3%	0	0,0%	3	2,0%
C39 (05 years old – defines seven words)	53	35,3%	50	33,3%	45	30,0%	0	0,0%	2	1,3%

Test of Equality of Two Proportions

Similar analysis was considered, by age level, the percentage was calculated for the total of children in relation to the behavior of standardization (50%, 75% and 90%).

From the analysis of the set of answers, a tendency of decrease was observed in the score "passed" as the age level increased (Figure 1), the same happened in the area related to "Language". Thus, the target behaviors were more frequently observed at two and three years old than those related to four and five years old. In relation to the age of two years old, all behaviors investigated in the four areas have shown coincident with the original standard.

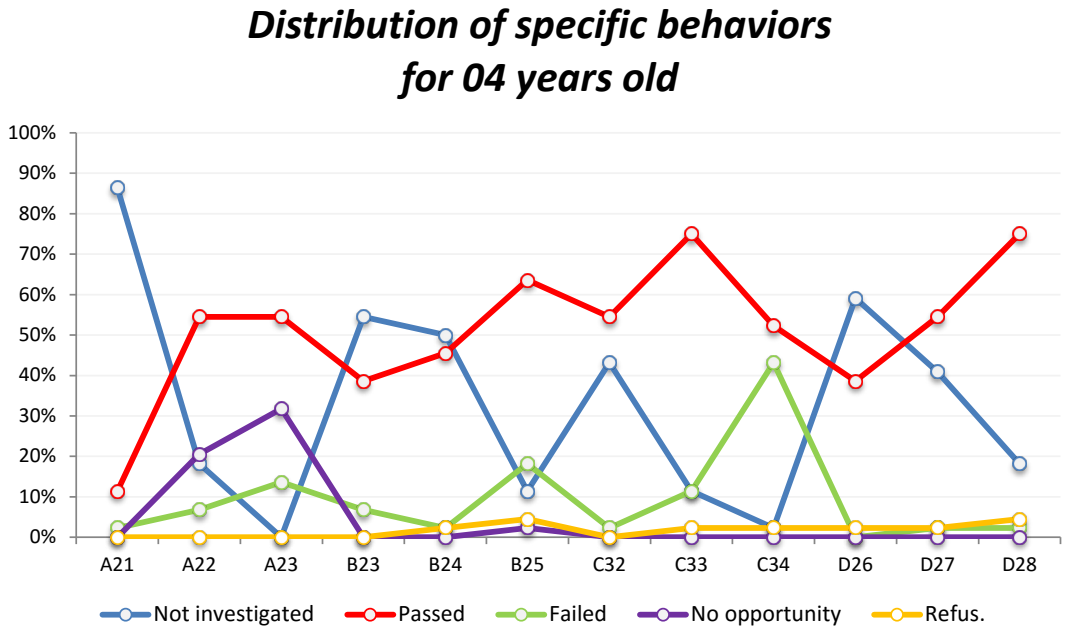

Figure 1 – Frequency of scores of specific behaviors for 03 and 04 years old

For the general analysis of Denver II, the Test of Equality of Two Proportions was used, in which 112 (74,7%) tests obtained "Normal" result and 38 (25,3%) "Questionable", this result being significant (p-value<0,001).

There was variation in the agreement between what was expected and what was registered in this study, in the area "Gross Motor", there was a larger quantity of behaviors in the age level expected (92,7%), followed by the area "Fine-Adaptive Motor" (75,3%), "Language" (62,7%) and "Personal Social" (58,7%) (Figure 02).

The distribution of the areas was analyzed individually and then associated to the general result. Table 02 shows the joint distribution to absolute values and their percentages among all combinations. It was verified that there is a meaningful relation and/or association between the general result and the four areas (bold, Table 2).

Beginning the analyzes of results obtained in the application of Denver II in the different areas in association to the sociodemographic variables, the analysis of variance ANOVA was performed. The significants identified were age (p=0,017) and mother schooling (p=0,001). Father schooling has manifested a tendency to be a significant (p= 0,057), especially in the result of the areas fine-motor adaptive and language (Table 3).

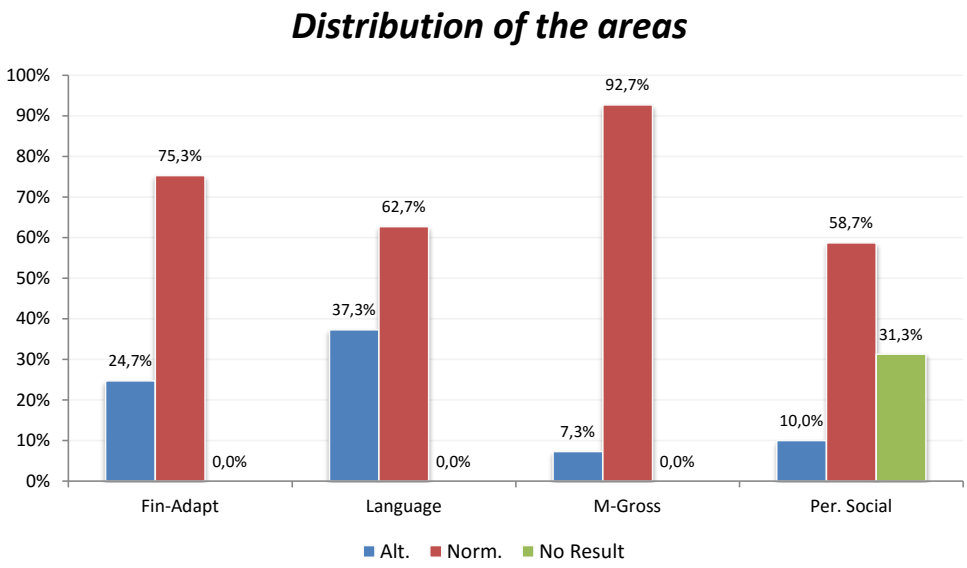

Figure 2 – Frequency of scores of behaviors of the areas of development

Table 2 – Distribution of frequency of Denver II with the areas of development

Area of Development		Denver II Normal		Denver II Questionable		Total		P-value
		N	%	N	%	N	%	
Personal Social	Altered	6	5%	9	24%	15	10%	**0,002**
	Normal	72	**64%**	16	42%	88	59%	
	No Result	34	30%	13	**34%**	47	31%	
Fin-Adap	Altered	18	16%	19	**50%**	37	25%	**<0,001**
	Normal	94	**84%**	19	50%	113	75%	
Language	Altered	26	23%	30	**79%**	56	37%	**<0,001**
	Normal	86	**77%**	8	21%	94	63%	
M-Gross	Altered	3	3%	8	**21%**	11	7%	**<0,001**
	Normal	109	**97%**	30	79%	139	93%	

Chi Square Test

Table 3 – Association of Denver II with the sociodemographic variables

Variable	Denver II	Average	Medium	Standard Deviation	CV	Min	Max	N	IC	p-value
Age	Normal	4,11	4,17	1,19	29%	2,00	5,98	112	0,22	**0,017**
	Questionable	4,60	4,55	0,71	15%	3,20	5,90	38	0,23	
Gestational Age	Normal	38,3	38,0	1,3	3%	37,0	40,0	51	0,3	0,696
	Questionable	38,5	38,0	1,2	3%	37,0	40,0	12	0,7	
Mother Age	Normal	31,1	32,0	6,2	20%	19,0	47,0	108	1,2	0,940
	Questionable	31,2	30,0	6,6	21%	21,0	48,0	27	2,5	
Mother School	Normal	12,0	11,0	3,3	28%	4,0	19,0	105	0,6	**0,001**
	Questionable	9,4	10,0	4,0	42%	3,0	17,0	25	1,6	
Father Age	Normal	34,2	34,0	7,3	21%	21,0	52,0	102	1,4	0,665
	Questionable	33,5	32,0	9,2	27%	21,0	60,0	25	3,6	
Father School	Normal	11,7	11,0	3,8	32%	3,0	22,0	104	0,7	**0,057**
	Questionable	9,9	11,0	5,4	54%	2,0	22,0	29	2,0	

ANOVA Test

DISCUSSION

The forty-eight target behaviors, in the four areas and in the four age levels studied were present in the registers evaluated. However, not all were registered in the frequency of occurrence proposed by the original standard. Some were registered in later ages and others in previous ages. At two years old all target behaviors were registered with the frequency expected. Among the areas the "Gross Motor" was that of highest coincidence.

In analysis[14] of children from zero to 03 years old, 68,8% were found in the Standards of normality. The area of best performance was Fine-Adaptive Motor" (3,75%) and that of worst performance was 'Language" (57,5%). Such a result is according to those found here of smaller coincidence with the original standard in Language. This difference in the frequency of behaviors in language is stressed as age increases.

In a study [15] constituted by children from zero to 24 months, 58,14% of the children evaluated presented Denver II "Normal" and 41,86% "Questionable". From these, 38% presented problems in the "Gross Motor" area, 32% in "Fine-Adaptive Motor", 18% in "Language" and 12% in the "Personal-Social" area. There were not, in such analysis, differences in the performance according to gender and parents schooling. This data is contrary to that presented in the study in question, in which maternal schooling is found to be the most significant factor in the areas studied.

It must be considered that, in spite of the use of the most recent and careful version, the sociocultural differences could affect the result obtained. As there are no normative data for Brazilian children, the possibility of influence of these factors cannot be excluded. Future studies must investigate the validity of the items in Denver II for the Brazilian population [16].

Many studies[17] have been carried out in different countries with the purpose to adapt and standardize the test to the local culture. Results of these studies have shown the need to exclude some items from Denver II for many reasons, among which: the difficulty of administration and interpretation by the examiners, high level of items pointed out as "refusal" or "no opportunity" and the irrelevance of the item for the culture of the country. It should be highlighted that a large part of the items questioned in the "Personal Social" area of this work have presented results "with no opportunity", which has made the identification difficult of presences in determined behaviors.

In Brazil, in a specific study, the performance of pre-school children was found to be similar to the normative sample[18]. In another analysis[12] a differential response was found in relation to the normative sample in the performance of children institutionalized in the ages of three and four years old, especially in the areas of "Language", "Personal-Social" and "Gross Motor". As well as the findings of the present research which have demonstrated differences mainly in relation to the two areas mentioned at first.

A high index of "Gross Motor" delay was found [19] in Brazilian children at 12 months, this being the area with most problems when compared to the others sectors of Denver II. Some studies justify that the acquisition of this ability may be related to the environmental conditions in which the child is inserted, since they are children from low income families, the limitations in the environmental stimulation may become more relevant with age[20]. Such findings were not found in this work, in which the area "Gross Motor" has been the Best adapted to the children of the sample.

In relation to the area of Language children also might not have found the needed stimulus to develop language patterns at the home environment, resulting in the worst performance. Low income families, such as those studied here, are generally constituted by parents of low educational level who have a long work shift, which may result in little time available to live with and stimulate the child [21]. Such difficulties in the items of language were found in this work, this being the area which presented bigger alteration in the general framework of responses. Which reinforces the hypothesis of influence of the social and cultural factors in the scores of the test, since the motor, cognitive communicative and adaptive functions develop by means of interaction with the environment, being quite dependant on the quantity and quality of the stimulus available [22].

In a study [20] maternal factors such as age, educational level and socioeconomic status were correlated to the items of language in all age levels studied. The influence of the parents schooling in the development of such an area for all the ages studied.

Focusing the personal-social area a research with children between 18 and 24 months[21] has found the best performance of the area in question in face of the others, data which has not been found in the present study, mostly due to the great difficulty to characterize the responses of such behaviors.

It is important to highlight that although the Denver II Screening test has had its psychometric properties examined in some national studies, it still does not have performance norms for the Brazilian population. The tools must be sensitive enough to detect indications of delay in children, from different

regions and social levels in the country, to permit orientation and intervention as early as possible[15].

In this study there was the limitation of the extension of the sample and the absence of instruments of validity which could be considered a standard for comparative analysis for the results of children in Denver II. Thus, it seems to us that it is necessary to broaden the population and then to review the general framework of reference of normality of manifestation of specific behaviors in Brazilian children in the early childhood.

CONCLUSION

The data found show that, for the sample studied, Denver II has a quantity of behaviors evaluated coincident with those of children from São Paulo submitted to it, in relation to the items proposed for evaluations in early childhood.

In the present study, from the evaluations considered, 74,7% have presented normal Denver. The areas of larger coincidence were respectively "Gross Motor", "Fine-Adaptive Motor", "Language" and "Personal-Social", especially in the age level of two years old and following the chronological order with three, four and five years old.

As for the sociodemographic variables, the age of the child and the parents schooling have shown to be significant, demonstrating the influence of the context of insertion of the child in the development.

This analysis reinforces the systemic and multifactorial nature of the development, and indicates the importance of following and monitoring in this period, especially in conditions of socioeconomic vulnerability.

Denver II has shown to be one of the best resources to follow the development and attend children in the early childhood, due to the importance of these areas of development and behavior evaluated with time markers. This is an instrument with good indexes of validity and reliability in its original version, and more studies are needed which focus on its adaptation and validation in the Brazilian version; the limitation of this test with children from São Paulo must be highlighted.

RESUMO

Objetivo: verificar a proporção de ocorrência de comportamentos nas áreas ("Motor Grosso", "Motor Fino-Adaptativo", "Pessoal Social" e "Linguagem") padronizados pelo Denver II, em crianças paulistanas e associar esta proporção com as variáveis sociodemográficas: idade e sexo da criança, idade gestacional, idade e escolaridade dos pais. **Métodos:** utilizou-se 150 prontuários de crianças típicas avaliadas pelo teste, sendo selecionados três comportamentos por área, entre 24 e 60 meses, com ocorrência prevista entre 50% e 90%. **Resultado:** a maioria dos comportamentos coincidiu com as idades propostas e aos dois anos todos foram observados na proporção prevista. Nas demais idades houve maior adequação da área "Motor Grosso", seguida por "Motor Fino-Adaptativo", "Linguagem" e "Pessoal Social". Conforme o aumento da idade houve menor coincidência de comportamentos na "Linguagem" e "Motor Fino-Adaptativo". **Conclusão:** os comportamentos descritos no Denver II foram observados em proporção semelhante neste estudo, especialmente na área motora e aos dois anos, seguindo sucessivamente dos três aos cinco anos.

DESCRITORES: Desenvolvimento Infantil; Triagem; Criança

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13. Sabatés AL, Lamônica DAC, Perissinoto J, Brêtas JS, Silva MGB, Rezende MA, Resegue RFS, Isotani SM. Teste de triagem do desenvolvimento Denver II: adaptação transcultural para a criança brasileira. Com autorização do autor Frankenburg WK. São Paulo, 2013.