Living conditions and receptive vocabulary of children aged two to five years

Condições de vida e vocabulário receptivo em crianças de dois a cinco anos

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Abstract

Objective
To assess the receptive vocabulary of children aged between two years and six months and five years and eleven months who were attending childcare centers and kindergarten schools.

Methods
An analytical cross-sectional study was carried out in the municipality of Embu, Southeastern Brazil. The Peabody Picture Vocabulary Test and analysis of factors associated with children's performance were applied. The sample consisted of 201 children of both genders, aged between two and six years. Statistical analysis was performed using multivariate analysis and logistic regression model. The dependent variable analyzed was test performance and the independent variables were child's age, mother's level of education and family socio-demographic characteristics.

Results
It was observed that 44.3% of the children had performances in the test that were below what would be expected for their age. The factors associated with the best performances in the test were child's age (OR=2.4; 95% CI: 1.6-3.5) and mother's education level (OR= 3.2; 95% CI: 1.3-7.4).

Conclusions
Mother's education level is important for child's language development. Settings such as childcare and kindergarten schools are protective factors for child development in families of low income and education.

Resumo

Objetivo
Avaliar o vocabulário receptivo de crianças de dois anos e seis meses a cinco anos e 11 meses que freqüentam creches e pré-escolas.

Métodos
Estudo transversal e analítico realizado no município de Embu, Estado de São Paulo. Utilizou-se o Teste de Vocabulário por Imagem Peabody e análise de fatores associados ao desempenho. A amostra foi constituída de 201 crianças de ambos os sexos, com idade entre dois e seis anos. Foram realizados análise multivariada e modelo de regressão logística. A variável dependente analisada foi o desempenho no teste e as variáveis independentes foram a idade da criança, tempo de escolaridade

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e série, e características sociodemográficas de suas famílias.
Resultados
Observou-se que 44,3% das crianças apresentaram desempenho inferior ao esperado para a idade no teste e os fatores associados ao melhor desempenho foram a idade da criança (OR=2,4; IC 95%: 1,6-3,5) e a escolaridade materna (OR=3,2; IC 95%: 1,3-7,4).
Conclusões
A escolaridade maternal é importante no desenvolvimento de linguagem da criança. As instituições como creches e pré- escolas são fatores de proteção do desenvolvimento infantil em famílias de baixa renda e com baixa escolaridade.

INTRODUCTION

Language use is a good predictor of intelligence and formal academic abilities and can be evaluated by means of verbal reception and output. Verbal reception and output backwardness is indicative of late development of language use and presents strong correlation with low intelligence scores and lack of academic ability.

The process of acquiring new words takes place with the passage from the use of gestures to the use of words. Vocabulary acquisition and expansion will depend on lexical development and the child's ability to resort to its lexis. Access to the lexis depends on the person's having a word in their vocabulary and being capable of rapidly resorting to it.[10]

Several authors have studied the process of lexical development and have observed an incremental step in the acquisition of new words among children aged 21 to 24 months, called the "vocabulary explosion".[13]

Among the factors that have an influence on vocabulary acquisition, it has been observed that the stimulus given by mothers to their children is important in the child's acquisition of new words. There is a positive correlation between parents' linguistic input and their child's frequency of verbal production. Mothers intuitively contribute towards the lexical development of their children through the way they present new words to them. The characteristics of the way parents speak and their ability to categorize are prognostic factors for the composition of the child's vocabulary and their acquisition of linguistic forms that are more complex.[6,9] Through experience and context, the child is capable of learning the meaning of a new word and also perceiving, by means of their interaction with an adult, how this adult organizes the information coming from their social and physical environment. Such interactions favor the development of language.

Many authors have studied the correlation between biological and social risk factors in relation to language deficiencies. It has been reported that social risks are most significantly related to cognitive and linguistic development.[7]

Among social risks, the mother's level of education is prominent as a determining factor for the child's vocabulary and communication skills.[5] In studies on infant health in Brazil, the mother's level of education revealed to be an important indicator, because it is associated with infant morbidity and mortality and the utilization of healthcare services.[11]

Considering that language development can be assessed via the number of words that make up the child's lexis, the Peabody Picture Vocabulary Test (PPVT) appears to be a good instrument for evaluating the language acquisition process in specific populations, such as groups of childcare and kindergarten children, since it assesses receptive vocabulary.

Thus, the present study had the objective of evaluating the association between receptive vocabulary and the socio-demographic indicators of families of children aged between two and five years.

METHODS

A descriptive analytical cross-sectional study was carried out among children aged between two years and six months and five years and 11 months who were attending educational programs in the municipality of Embu, state of São Paulo, Southeastern Brazil.

The municipality of Embu lies within the metropolitan region of São Paulo and its population was 206,781 inhabitants in the year 2000.[15] Its economy is based on small and medium-sized industries that absorb a small proportion of the population. The majority of the population, however, works outside of the municipality. The average family income is low; more than 90% of the houses have water supply, but only 43.5% have sewage system.

With regard to infant education, local authorities maintain[13] directly administered childcare centers, for which the municipality shoulders all costs of human resources and food. The municipality has other 14 childcare centers belonging to entities that have entered into arrangements with the local authorities. These childcare centers serve children aged zero to four years, and from that age children attend local kindergartens. The number of childcare centers and kindergarten schools is insufficient to attend the children population at this age range in the city. The service is supplemented by private institutions.

The study was conducted in three public childcare centers and kindergarten schools, maintained by the city administration, randomly selected. The age group studied is appropriate for the application of the PPVT, which can be utilized since the age of 30 months. In the year 2000, 2,227 children in this age group were enrolled in local infant schools. According to Andrade[1] (1996), who has found a prevalence of approximately 15% of language deficiencies in similar populations, the sample size was calculated using a 95% confidence interval and 5% precision, resulting in 210 children of both sexes. After considering the possibility of sample losses, a sample size of 250 children was randomly selected by drawing lots.

In the study settings, children were randomly selected from rooms having the study age range, and complying with the proportionality per grade. The selected classrooms were: Kindergarten II (KII), Kindergarten IV (KIV) and Pre-school I.

Three qualified speech language pathologists performed the procedures of data collection and test application. The test was applied individually and lasted an average of 15 to 20 minutes per child.

The questionnaire about the child's physical living conditions, family's demographic composition and socio-economic condition was filled out through an interview arranged in advance with parents. The levels of education and income considered are the same used officially by the Brazilian government.

The procedures for hearing screening follows Azevedo[2] (1996). Children who had a positive response to both stimuli (presence of cochlear-palpebral reflex and positive responses using the pediatric audiometer in both ears) were considered to have passed the hearing screening. Failure in one of the two stimuli meant that the child was referred for performing complete hearing assessment, and such children were excluded from the study.

The PPVT is a test of verbal skills, created for measuring receptive vocabulary. It is greatly utilized in surveys because it is fast and easy to apply, and has already been adapted for use in different languages. This test was translated and adapted for Brazilian children in 1997 (Capovilla & Capovilla,[4] 1997). It contains 125 cards with four black-and-white drawings on each one. The examiner says a word and the respondent has to indicate the drawing that best represents the word said. As it advances the test has an increasing level of difficulty. The drawings are shown to the child in sequence until eight consecutive mistakes are made. At this point, the test is stopped. The child's responses are recorded on a specific form and the number of correct responses is totaled at the end of the test. This figure is converted into weighted scores given in a table that is standardized by age range. From the scores obtained from the table, it is possible to classify the child's performance as follows: extremely low (between -2 and -3 standard deviations, SD): scores 55-69; low (-1 and -2 SD): 70-84; average (+1 and -1 SD): 85-114; moderately high (1 and 2 SD): 115-130; and extremely high (2 and 3 SD): 131-145. An additional category was added to this classification: "less than -3 standard deviations": scores lower than 55.

However, two categories were considered for the statistical analysis: less than expected for the age (corresponding to the classifications "less than -3 standard deviations" and extremely low) and expected for the age (corresponding to the classifications low and average).

The Chi-square test was utilized for comparisons of the category variables between the two groups.

The expected result from the PPVT was considered to be a variable response. A logistical regression model was used in the multivariate analysis, when there were analyzed variables that reached p-values of less than or equal to 20% in the simple analysis. For this analysis, a MULTLR statistical program was utilized at 5% significance level (alpha=0.05).[3]

The study was approved by the Research Ethics Committee of the Escola Paulista de Medicina of Universidade Federal de São Paulo, and all parents signed a consent form authorizing their children participation in the study.

RESULTS

The total sample comprised 210 children, 59.2% males and 40.8% females. Concerning age, 38.3% were four to five years old; 32.3% were three to four

Table 1 - The Peabody Picture Vocabulary Test (PPVT) results according to gender, age and school year group. Municipality of Embu, Southeastern Brazil, 2000.

Variable	PPVT				Total		χ^2	p-value
	Less than expected for the age		Expected for the age					
N=201	N	%	N	%	N	%		
Gender								
Male	51	42.9	68	57.1	119	59.2	0.62	
Female	38	46.3	44	53.0	82	40.8		
Age								
2-3 years	9	90.0	1	10.0	10	5.0	25.3	<0.001
3-4 years	40	61.5	25	38.5	65	32.3		
4-5 years	27	35.1	50	64.9	77	38.3		
>5 years	13	26.5	36	73.5	49	24.4		
School year group								
K III	38	70.4	16	29.6	54	26.9	22.78	<0.001
K VI	30	41.1	43	58.9	73	36.3		
Pre-school I	21	28.4	53	71.6	74	36.8		

N: Total number of data points relating to the analyzed variable
K: kindergarten school

years old; 24.4% were five years old or above and 5% were two to three years old.

Concerning time at school, 41.7% had been attending childcare centers or kindergarten school for six months and only 10% had been attending them for 25 months or more. Among the remaining, 28.9% of the children had been attending them from seven to 12 months and 19.4% from 13 to 24 months.

Only 112 children (55.7%) showed results in the "expected for the age" category (PPVT between 1 and -2 SD). The other 89 (44.3%) did not attain the results expected for their age (PPVT of less than -2 SD).

It was observed that 59.2% of the sample consisted of males and the greatest concentration of children was in the age group three to four years old.

Table 1 presents the PPVT data according to child's gender, age and school year group. A statistically significant association between the performance in the PPVT and child's age and school year group was ob-

served. Older children and those in more advanced school year groups had better performances in the test. Children in the two-year-old age group presented the highest frequency of performances that were less than the expected for the age.

With regard to the socio-demographic background, 82.1% of the mothers had had more than three years of education. More than 50.0% of the mothers worked and 41.0% of them had full-time jobs. Regarding family income, 37.8% of the families had low incomes.

Table 2 presents the analysis of the children's performance in the PPVT according to socio-demographic variables. It was observed a statistically significant association in relation to the mother's level of education and work performed. Children of mothers who had more years of education and worked full-time had better performances. Children who had a sibling also had better performance in the test.

For the multivariate analysis, the following variables were included: child's age, school year group,

Table 2 - The Peabody Picture Vocabulary Test (PPVT) results according to socio-demographic variables. Municipality of Embu, Southeastern Brazil, 2000.

Socio-demographic background	PPVT				Total		χ^2	p-value
	Less than expected for the age		Expected for the age					
	N	%	N	%	N	%		
Number of siblings (N=181)								
0	18	52.9	16	47.1	34	18.8	10.87	0.001
1	21	31.8	45	68.2	66	36.5		
2	22	51.2	21	48.8	43	23.8		
3 or more	24	63.2	14	36.8	38	21.0		
Mother's level of education (N=162)								
Up to three years of education	20	69.0	9	31.0	29	17.9	7.26	<0.001
More than three years of education	55	41.4	78	58.6	133	82.1		
Mother's job status (N=195)								
Did not work	46	54.1	39	45.9	85	43.6	7.91	0.001
Part-time job	14	46.7	16	53.3	30	15.4		
Full-time job	26	32.5	54	67.5	80	41.0		
Up to 2 minimum monthly wages	38	50.0	38	50.0	76	37.8	0.20	
More than 2 minimum monthly wages	51	40.8	74	59.2	125	62.2		

N: Total number of data points relating to the analyzed variable.

number of siblings, and mother's level of education and her working day. The results associated with the best performances in the PPVT were child's age (OR=2.4; 95% CI: 1.6-3.5) and mother's level of education (OR=3.2; 95% CI: 1.3-7.4). In other words, the greater the child's age and mother's level of education, the better was the performance in the test.

DISCUSSION

In this study, 44.3% of the children attained results that were less than the expected for the age. This proportion is high and might be related to the sociocultural characteristics of the studied population, where the purchasing power is low as well as the levels of education levels.

The literature shows correlations between low scores in the PPVT and social risks.[12] Some studies have reported that children of lower socio-economic condition have a poor performance in language, vocabulary and articulation tests, and such results have been related to their social conditions.[8,14]

A statistically significant association was observed between the child's age and better performance in the PPVT. Older children had better results in the test. A correlation between the child's age and school year group was found, but this fact lost significance because the school year group was already included in the main variable (age).

The mother's level of education showed a statistically significant association with better performance in the PPVT. The greater the mother's level of education, the greater the child's vocabulary. The mother's level of education is a social indicator used in research in several countries, and it has correlations with measurements of receptive vocabulary like the PPVT.[16] Low levels of education among mothers, in association with unfavorable economic conditions, increase the likelihood of deficiencies in children's overall development.

There was a correlation between the mother's level of education and her working day. Mother's job is related to her level of education and greater levels of education mean better jobs. Mothers who worked full-time had more years of education and their children had greater receptive vocabulary. In such cases, it can be argued that there is a positive and protective effect from the school conditioning that children of working mothers of low socio-economic condition are exposed to. However, it can also be pointed out that the fact that mothers who work outside the home have a different social standing, because it allows them to contribute to providing their family income, increases their self-esteem and fosters personal fulfillment. These mothers will have relationships outside of the exclusive context of the family and, consequently, more access to information. Thus, this will enrich their own vocabulary and use of language, thereby making them an active interlocutor in the stimulation of the child's language.

Infant education institutions are also important agents in the process of child development, not only to formal education, but also in their overall development. Given that for low-income populations, school is a place where the child establishes relationships outside the family and where there are opportunities for receiving regular meals, recreation and learning. School also provides a point of contact for families within the same community and allows them to participate in the organization of that community, contributing for its growth and improvement of living conditions.

The large number of social variables that influence child development means that many problems can only be solved with the participation of several actors. This should be discussed by the community, the school and healthcare services and they have to work together on projects for child development.

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