

Knowledge of caregivers and factors associated with neuropsychomotor development in children

Conhecimento dos cuidadores e fatores associados ao desenvolvimento neuropsicomotor em crianças
Conocimiento de los cuidadores y factores relacionados al desarrollo neuropsicomotor en niños

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ABSTRACT

Objectives: to analyze the knowledge of caregivers and the factors associated with neuropsychomotor development in children. **Methods:** a cross-sectional study, with a quantitative approach, was conducted with 220 child-caregiver binomials attended in the public health services of the municipality of Parnaíba, State of Piauí. The study used the "Denver Test II" and the "Inventory of Child Development Knowledge". **Results:** the study classified 197 children with natural development and 23 with suspicious development. Caregivers with a higher level of knowledge about child development were associated with children with better development. The study considered caregiver knowledge, gestational age, and exclusive breastfeeding as protective factors for appropriate neuropsychomotor development when used the regression model. **Conclusions:** actions aimed at indicators that presented positive associations must be implemented to improve child development, such as educational activities to increase the level of knowledge of caregivers, improvement of prenatal monitoring, and encouragement of breastfeeding.

Descriptors: Child Development; Caregivers; Knowledge; Child Health; Health Education.

RESUMO

Objetivos: analisar o conhecimento dos cuidadores e os fatores associados ao desenvolvimento neuropsicomotor em crianças. **Métodos:** estudo transversal, de abordagem quantitativa, realizado com 220 binômios criança-cuidador atendidos nos serviços públicos de saúde do município de Parnaíba, estado do Piauí. Foi utilizado o "Teste de Denver II" e o "Inventário do Conhecimento de Desenvolvimento Infantil". **Resultados:** 197 crianças foram classificadas com desenvolvimento normal; e 23, com desenvolvimento suspeito. Cuidadores com maior nível de conhecimento sobre o desenvolvimento infantil foram associados a crianças com melhor desenvolvimento. Mediante o modelo de regressão, encontrou-se conhecimento dos cuidadores, idade gestacional e aleitamento materno exclusivo como fatores protetores para um desenvolvimento neuropsicomotor adequado. **Conclusões:** para a melhora do desenvolvimento infantil, ações destinadas aos indicadores que apresentaram associações positivas devem ser realizadas, como atividades de educação para aumento do nível de conhecimento dos cuidadores, melhora do acompanhamento pré-natal e incentivo ao aleitamento materno.

Descritores: Desenvolvimento Infantil; Cuidadores; Conhecimento, Saúde da Criança; Educação em Saúde.

RESUMEN

Objetivos: analizar el conocimiento de los cuidadores y factores relacionados al desarrollo neuropsicomotor en niños. **Métodos:** estudio transversal, de abordaje cuantitativo, realizado con 220 binomios niño-cuidador atendidos en los servicios públicos de salud del municipio de Parnaíba, estado de Piauí. Fue utilizado el "Test de Denver II" e "Inventario del Conocimiento de Desarrollo Infantil". **Resultados:** 197 niños fueron clasificados con desarrollo normal; y 23, con desarrollo sospechoso. Cuidadores con mayor nivel de conocimiento sobre el desarrollo infantil fueron relacionados a niños con mejor desarrollo. Mediante el modelo de regresión, se encontró conocimiento de los cuidadores, edad gestacional y lactancia materna exclusiva como factores protectores para un desarrollo neuropsicomotor adecuado. **Conclusiones:** para la mejora del desarrollo infantil, acciones destinadas a los indicadores que presentaron relaciones positivas deben ser realizadas, como actividades de educación para aumento del nivel de conocimiento de los cuidadores, mejora del acompañamiento prenatal e incentivo a lactancia materna.

Descritores: Desarrollo Infantil; Cuidadores; Conocimiento; Salud del Niño; Educación en Salud.

INTRODUCTION

Initiated from intrauterine life, childhood neuropsychomotor development (NPMD) is an essential and unique process that every child experiences. It is considered a complex, continuous, dynamic and progressive transformation that causes changes in several areas (physical, social, emotional and cognitive), in a mixed interaction between them and the environment, in which each period is built on the basis of the previous stages⁽¹⁻²⁾.

This development results from the mutual influence between genetic inheritance and the environment in which the child lives. Since the architecture of the child's brains shapes in the first years of life, increased attention in early childhood (marked from 0 to 6 years of age) will result in benefits that last for life and will affect health, learning, autonomy, and social awareness⁽³⁾.

Studies indicate high rates of delay in childhood's NPMD, marked in the international literature with a prevalence of 16% to 18% of children⁽⁴⁾, finding an even higher percentage (29.5% to 30.8%) in Brazilian studies⁽⁴⁻⁵⁾. In addition, studies estimate that health professionals can only detect 30% of children with developmental delays and, in general, only in children with more severe delays⁽⁶⁾. As a public health problem, an early diagnosis and intervention in childhood's NPMD is one hundred times less than the cost of treating a child with a late diagnosis⁽⁷⁾.

Thus, the environment in which the child lives is a critical factor for its development. The first social structure which the child inserts is the family, and it has a major influence on its global development⁽⁸⁾. Within this aspect, evidence points out that mothers with better knowledge about childhood NPMD are more likely to create an appropriate home environment that helps their child in all stages of development⁽⁹⁾.

Considering the various risk factors for childhood NPMD, which range from prenatal variables to issues related to the environment and parental aspects, there are no studies in the literature that associate the level of knowledge of caregivers with the development of the child as an independent risk factor or adjusted with other variables. Therefore, there is the debate: Is caregivers' knowledge about child development independently associated with neuropsychomotor development? Is this association maintained when variables related to the sociodemographic and clinical characteristics of the child and caregiver are inserted?

Answering this question brings advances to nursing care provided in the field of child health, guiding professionals on management strategies to obtain a better childhood neuropsychomotor development and better care offered to the child-caregiver-family triad.

OBJECTIVES

To analyze the knowledge of caregivers and the factors associated with neuropsychomotor development in children.

METHODS

Ethical aspects

The study respects the ethical precepts provided for by Resolution 466/2012 of the National Health Council. The Research Ethics

Committee of the Federal University of Piauí approved the project. This work derives from the academic master's degree thesis entitled "Child Development: knowledge of caregivers and other associated factors," presented within the Graduate Program in Biomedical Sciences of the Federal University of Piauí in April 2021.

Design, period and place of study

The strobe tool (Strengthening the Reporting of Observational Studies in Epidemiology) guided this cross-sectional observational study of a quantitative approach. It was performed in the public health services of the municipality of Parnaíba, State of Piauí, Brazil, from February 2020 to January 2021. Within the scope of Primary Care, the municipality is subdivided into four health districts. Researchers collected data in four Family Health Units, one in each district. They chose the units for convenience, and the inclusion criterion was to have a suitable room for evaluation of the child, with a fixed stretcher for the office. The collection also took place in two specialized pediatric services in the municipality.

Population and sample

The study population was 2,531 children up to 2 years of age, accompanied by the public health network of the municipality and their respective caregivers. The sample was calculated by the formula for finite population, adopting error of 5%, confidence interval of 95%, and prevalence rate of delay in neuropsychomotor development of 19%⁽¹⁰⁾. This research used the cluster sampling technique. The calculation resulted in a sample of 217 participants, and it collected data from 220 child-caregiver binomials.

The study adopted the inclusion criteria that the caregiver must be 18 years of age or older and the child must be between 0 and 24 months of age since this is the extrauterine stage in which the nervous tissue develops the most and is most subject to injuries. Due to plasticity, it is also at this time that the child responds better to therapies and the stimuli he receives from the environment⁽¹¹⁾.

The study excluded children/caregivers with respiratory symptoms, hearing impairment, and people who did not communicate verbally from this contingent. In addition to these factors, it also excluded children with congenital malformation, such as cleft palate, cleft lip, and/or with some visual deficit, hearing, or sequelae due to central nervous system involvement. These factors were verified by direct observation and/or questioned by the caregiver. The study adopted such criteria because of the risk of bias in the evaluation of the child's development.

Study protocol

The research took place in the public health services of the municipality. The approach was carried out in the waiting rooms of the establishments with the presentation of the researcher, explanation of the research and its objectives, and the importance of the study as well. Due to the COVID-19 pandemic (SARS-CoV-2), the study adopted prevention and control measures according to the Ministry of Health recommendations. The care was related to the use of a mask during the collection to prevent the spread of droplets, use of 70% alcohol to sanitize the hands and materials used during the research, and social distancing of at least one meter⁽¹²⁾.

The researcher asked each child-caregiver binomial to go to a room reserved for the research and then invited them to participate in the study. Those who agreed signed the Informed Consent Form (ICF), provided in two ways (one for the respondent and one for the researcher), guaranteeing the participant the right to withdraw from the survey at any time.

The authors used a structured questionnaire prepared by the authors to collect the sociodemographic and clinical data of the sample. The questions concerning the child included nine items: gender, age, birth weight, type of delivery, gestational age, the fact of having a sibling(s), neonatal screening, vaccination, and exclusive breastfeeding (EBF). The questions regarding maternal and/or caregiver information included eight items: current age, the age that became pregnant, prenatal care, race/color, education, employment status, marital status, and income.

The study used the Portuguese version of the KIDI (Child Development Knowledge Inventory⁽¹³⁾), translated and adapted by Ribas et al.⁽¹⁴⁾, to assess the level of knowledge of caregivers about CD. It is an instrument composed of 75 questions, subdivided into four groups: 1) norms and milestones (most likely periods for the acquisition of motor, perceptual and cognitive skills); 2) principles (factors responsible for development); 3) care (parental practices more appropriate to care for children); 4) Health and safety (care related to food, hygiene, and safety).

Of these questions, 48 require the respondent to choose one from three responses (I agree, disagree, or not sure) over a series of statements. Another 20 questions require choosing from four responses (agree, younger, older, not sure) related to statements about at what age the child acquires particular skills. Finally, seven questions require choosing one from five answers. The knowledge analysis was made by accounting for the number of hits, errors, and indecisions of the interviewees about the applied issues, making an assessment not only general but also specific to each area addressed.

For the evaluation of the childhood NPMD, the dependent variable (outcome) of this study, the researchers used the Denver II test, according to the user instructions of its manual⁽¹⁵⁾. This test can be applied in children from 0 to 6 years of age and consists of 125 items, divided into four areas: 1) social-personal, 2) fine-adaptive motor, 3) language, and 4) gross motor. Each item corresponds to a task to check if the child has mastered a specific skill. The researcher recorded these items by looking directly at the child or, in some cases, asked the caregiver to inform whether or not the child performs a particular task.

The study applies items according to the child's age and register whether he passes or failed the task or if he refuses to do it. If the child fails the task or refuses to perform something in which he has already passed the age to perform, he receives a delay signal. If the child fails or refuses to do a task for the current age, he receives a caution signal. The overall classification of the test is made according to the number of failures (delay and caution) so that the study consider the NPMD as 1) normal – when there were no delays and one caution at most; (2) suspicious – when there were two or more precautions and/or one or more delays.

The study corrected the ages of premature children born before 37 weeks of gestation, and up to 12 months old at the time of testing to prevent overestimations of suspicious results. This correction was performed using the formula: corrected age

(weeks) = chronological age (weeks) – 40 weeks (ideal gestational age). Data collection had an average duration of 25 minutes.

Analysis of results and statistics

The obtained data were stored on a virtual database and received statistical treatment through the SPSS software (Windows version 20), which estimated the percentages of dichotomous variables, means and standard deviations of continuous variables, and the associations between the variables. The study applied the Kolmogorov-Smirnov test to observe the normality of the data.

In the bivariate analysis, the study used the test *t* to verify an association of Denver II with continuous variables. For nominal variables, it used chi-square and likelihood ratio tests. In the multivariate analysis, multiple logistic regression was performed by the method of backward stepwise. The research chose the variables for insertion when *p* was less than 0.20, and the permanence of the variable in the model occurred when *p* was less than 0.05. In the statistical tests, a significance level of 95% ($p < 0.05$) was considered. The analysis took place according to the relevant literature, and the results were presented in a descriptive-analytical way in graphs and tables, allowing their better explanation.

RESULTS

In the sample of children, the majority were male (55.5%), mean age of 8.5 months (± 6.1 SD), presenting the largest number of children in the age group less than six months (40.9%); born at the end of gestational period (85.5%), vaginal birth (52.7%), and with adequate weight (2,500 g – 4,000 g) (73.6%). Most of the children had performed the recommended neonatal screening tests (biological screening, auditory, lingual frenulum evaluation, pulse oximetry, and red reflex test) (65.5%), had been or were in exclusive breastfeeding (EBF) until the 6th month of life (51.8%), had updated vaccination record (65.9%), and had siblings (61.8%).

As for the sociodemographic and clinical characteristics of the caregivers, the mean age was 28.2 years (± 7.5 SD). Most of the children's mothers became pregnant between the ages of 15 and 35 years (90%), with an average of 26.1 years (± 5.9 SD) and performed six or more prenatal visits (78.2%), self-declared brown (63.2%), high school was the most found level of schooling among caregivers (57.3%), most were unemployed (70%), had an income of up to one minimum wage (68.2%) and were married or had a stable union (80.5%).

Table 1 presents the results of the Denver II test. Most of the children presented normal development ($n = 197$; 89.5%), but 10.5% showed suspicious development. Among the four aspects evaluated in the test, the language area presented the highest number of children with delays/cautions ($n = 15$; 6.8%), followed by the fine-adaptive motor ($N = 9$; 4.1%), and gross motor ($N = 8$; 3.6%). The best-evaluated area was personnel-social with a higher percentage of children with adequate development ($n = 215$; 97.7%).

Regarding the caregivers' education, following the KIDI, we obtained an average percentage of correct answers of 67.9% concerning the total number of questions on the test, followed by 26.8% of errors and 0.5% of uncertainties. The group of questions with the highest accuracy was Health and Safety (84.3%), followed

by the Care Practices group with 68.4%. The group of questions on Norms and Milestones was the group with the highest score of errors (31.2%) and uncertainties (6.4%).

Table 1 - Evaluation of childhood neuropsychomotor development through the Denver II test, Parnaíba, Piauí, Brazil, 2021

Results	Frequency	%
Result in two categories		
Normal	197	89.5
Suspect	23	10.5
Results by tested areas		
Personal-social		
Normal	215	97.7
Suspect	5	2.3
Fine-adaptive motor		
Normal	211	95.9
Suspect	9	4.1
Language		
Normal	205	93.2
Suspect	15	6.8
Gross motor		
Normal	212	96.4
Suspect	8	3.6

Table 2 shows the association of caregivers' knowledge about child development with the childhood NPMD. It showed that caregivers of children classified with normal development had a higher average of hits than children's caregivers with suspected development. This factor was observed both in the total mean and in the subdivision of the questions by areas - Care; Health; Norms and Milestones; and Principles. All parameters showed a significant association ($p < 0.05$) between knowledge and development.

Table 2 - Association of the level of caregivers' knowledge about child development with the classification of childhood neuropsychomotor development — (Denver II), Parnaíba, Piauí, Brazil, 2021

Knowledge	Denver II	Media	Standard deviation	p value*
Care	Normal	9.70	2.27	0.021
	Suspect	8.52	2.53	
Health	Normal	10.20	1.33	0.002
	Suspect	9.30	1.29	
Norms and Milestones	Normal	20.14	3.60	0.004
	Suspect	17.86	3.13	
Principles	Normal	11.53	2.43	< 0.001
	Suspect	8.86	2.71	

* Test t of Student.

Table 3 presents the association of sociodemographic and clinical variables of children with the result of the Denver II test. Regarding the variables of the children, those of the female sex, in the lactating phase, born at term, of vaginal delivery, with adequate birth weight, complete neonatal screening, who had exclusive breastfeeding, had updated vaccination record and had no sibling(s) had a higher percentage of adequate development. The variables "phased age," "exclusive breastfeeding," and "vaccination" showed statistically significant association ($p < 0.05$).

Regarding the association of caregiver variables with the Denver II test score (Table 4), caregivers aged between 18 and

40 years presented a higher percentage of children with normal development, who became pregnant over 35, had prenatal care, had a brown color, higher education, were employed, were married/had a stable union and income above three minimum wages. The only caregiver variable that presented a statistically significant association was education ($p = 0.008$).

Table 3 - Prevalence and association of sociodemographic and clinical variables of children with the classification of childhood neuropsychomotor development — (Denver II), Parnaíba, Piauí, Brazil, 2021

Variables	Denver II (n = 220)		p value
	Normal	Suspect	
Gender			0.579*
Male	108 (88.5%)	14 (11.5%)	
Female	89 (90.8%)	9 (9.2%)	
Age by stages			0.034*
Newborn < 28 days	15 (100%)	0 (0%)	
Infant 28 days to 11 months	130 (91.5%)	12 (8.5%)	
Infant 12 to 24 months	52 (82.5%)	11 (17.5%)	
Gestational age			0.097†
Term	171 (91.0%)	17 (9.0%)	
Preterm	26 (81.2%)	6 (18.8%)	
Type of delivery			0.348*
Cesarean	91 (87.5%)	13 (12.5%)	
Vaginal	106 (91.4%)	10 (8.6%)	
Birth weight			0.624†
Low weight	37 (86%)	6 (14%)	
Appropriate	147 (90.7%)	15 (9.3%)	
Overweight	13 (86.7%)	2 (13.3%)	
Screening			0.157†
Complete	132 (91.7%)	12 (8.3%)	
Incomplete	65 (85.5%)	11 (14.5%)	
LOVE			0.022*
Accomplished	97 (85.1%)	17 (14.9%)	
Not realized	100 (94.3%)	6 (5.7%)	
Vaccination			0.020*
Updated	135 (93.1%)	10 (6.9%)	
Outdated	62 (82.7%)	13 (17.3%)	
Has sibling(s)			0.723†
Yes	121 (89%)	15 (11%)	
No	76 (90.5%)	8 (9.5%)	

* likelihood ratio; † chi-square.

Table 4 - Prevalence and association of sociodemographic and clinical variables of caregivers with the classification of childhood neuropsychomotor development — (Denver II), Parnaíba, Piauí, Brazil, 2021

Variables	Denver (n = 220)		p value
	Normal	Suspect	
Age			0.839*
< 18 years	4 (80%)	1 (20%)	
18 to 40 years	182 (89.7%)	21 (10.3%)	
41 to 59 years	9 (90%)	1 (10%)	
Over 59 years	2 (100%)	0 (0%)	
Age that became pregnant			0.884*
< 15 years	1 (100%)	0 (0%)	
15 to 35 years	9.4%	21 (10.6%)	
> 35 years	19 (90.5%)	2 (9.5%)	
Prenatal			0.290†
Accomplished	156 (90.7%)	16 (9.3%)	
Not accomplished	41 (85.4%)	7 (14.6%)	
Race/color			0.096†
White	41 (91.1%)	4 (8.9%)	
Black	26 (83.9%)	5 (16.1%)	
Yellow	3 (60%)	2 (40%)	
Mixed race	127 (91.4%)	12 (8.6%)	

To be continued

Table 4 (concluded)

Variables	Denver (n = 220)		p value
	Normal	Suspect	
Education			
Primary school	52 (79.4%)	13 (20.6%)	0.008*
High school	117 (92.9%)	9 (7.1%)	
Higher school	30 (96.8%)	1 (3.2%)	
Employment situation			
Employed	61 (93.8%)	4 (6.2%)	0.144*
Unemployed	135 (87.7%)	19 (12.3%)	
Retiree	1 (100%)	0 (0%)	
Marital			
Married/Stable	160 (90.4%)	17 (9.6%)	0.725*
Single	33 (86.8%)	5 (13.2%)	
Widow	1 (100%)	0 (0%)	
Divorced	3 (75%)	1 (25%)	
Income			
Up to 1 min wage	133 (88.7%)	17 (11.3%)	0.200*
2 to 3 min. wages	50 (89.3%)	6 (10.7%)	
Abv 3 min wages	14 (100%)	0 (0%)	

* likelihood ratio; † chi-square.

Table 5 presents the variables that, after adjustment in logistic regression, remained associated with childhood development. The final model showed that the 1.1 point increase in the level of the caregivers' knowledge about child development increases the chances of a normal NPMD; children born at term who perform exclusive breastfeeding increase the probability of an adequate development by up to 80%. The model was adjusted by the variable "screening".

Table 5 - Final model of hierarchical logistic regression of predictor variables of childhood development in children served in public health services, Parnaíba, Piauí, Brazil, 2021

Variable	p value	CI 95%
KIDI total	< 0.001	1.141 (1.067;1.220)
Screening	0.079	0.415 (0.155;1.106)
Exclusive breastfeeding	0.012	0.244 (0.081;0.735)
Gestational age	0.012	0.204 (0.059;0.703)
Constant	< 0.001	8.565

CI – confidence interval. 0.127 (R2 Cox & Snell); 0.261 (R2 Nagelkerke).

DISCUSSION

The study associated caregivers with greater ownership over child development with children with better neuropsychomotor development verified in the bivariate and multivariate analysis. Researchers point out that parents with a higher level of knowledge about child development and its stages present a more appropriate behavior concerning the care of their children. On the other hand, parents who do not know this issue are more likely to behave inappropriately, and may, in a way, affect the development of the child⁽¹⁶⁾.

In the evaluation according to KIDI in the areas of caregivers' knowledge, this research corroborated the results of a similar study conducted with mothers and caregivers in the state of Pará, which also found a higher number of hits on health and safety issues and a higher number of errors/uncertainties in the aspects of norms and milestones⁽¹⁷⁾.

Among the attributes of Primary Care, researchers show that the aspect "family orientation and community orientation" is the one that presents the highest rate of dissatisfaction among children caregivers. This finding reveals the need to promote health actions aimed at both the individual and his family to make changes in the environment in which they live⁽¹⁸⁾.

The Brazilian Single Health System (SUS) structures health care in three levels of complexity: primary, secondary, and tertiary. It organizes these levels in an articulated and orderly manner, aiming at offering comprehensive health care through actions of promotion, prevention, recovery, and rehabilitation of individuals⁽¹⁹⁾.

Within the field of promotion, health education consists of a priority strategy to achieve this goal. The actions of health education belong to the nursing care component and can be used by nurses as a direction for the population reflection. This strategy, in addition to providing integral care, is transformative, making users active and autonomous concerning health so that they can rethink their realities, in addition to providing comprehensive care⁽²⁰⁾.

In this context, when we look for studies related to health education practices in the maternal-infant field in the literature, the most recurrent findings are related to breastfeeding, rights of the pregnant woman, prevention of parasitic diseases, hygiene care, and nutrition⁽²¹⁻²⁵⁾. Since the area of knowledge Norms and Milestones (KIDI) is the one that presented the highest percentage of errors/uncertainties in this study, and there are no studies focused on this topic in the literature, the research shows that nurses need to carry out health education actions that involve the guidance of caregivers on the milestones of the childhood NPMD. They can carry out these activities in the practice office, in-home visits, in operational groups, or round table discussions⁽²⁰⁾, aiming to increase this knowledge and consequent improvement of childhood NPMD.

Regarding the screening of childhood NPMD through Denver II, a similar study conducted in the State of Rio Grande do Sul also found language mastery as the most affected area among children⁽²⁶⁾. Delays in the child's language development can occur for many reasons, such as parent's poor education, the presence of four or more children living in the same residence, family history of delay, the father working full time, poor quality of communication with the mother, and the fact that the family does not have the habit of reading to the child. Protective factors for language development include higher parental education, the caregiver frequently talking with the child, the couple having only one child, the caregiver reading to the child daily, and maternal responsiveness⁽²⁷⁾.

In the preventive issues in the child health field, this research results showed that children who performed EBF presented better development when compared to those who did not. Breast milk is a food of extreme importance for the baby, having numerous benefits when compared to other types of milk. It has nutritional advantages that promote proper growth and development, and it is also rich in fats, minerals, vitamins, enzymes, and immunoglobulins. Breastfeeding is a crucial link between mother and child, and it is the isolated strategy that most prevents infant deaths, in addition to promoting the physical, mental, and psychic health of the child and the mother⁽²⁸⁾.

Another preventive strategy that presented a significant statistical association with adequate development was vaccination, which was responsible for effectively reducing the morbidity and mortality of diseases. Immunization is one of the safest, most economical, and effective public health interventions to prevent deaths and improve quality of life, especially in populations with greater social vulnerability. It contributes to the achievement of one of the Millennium Development Goals, the reduction of

infant mortality since unvaccinated children are susceptible to the highest child morbidity and mortality⁽⁴⁾.

Concerning the caregiver variables associated with childhood NPMD, participating caregivers who had higher education, employment, and earned above three minimum wages were connected to children with better NPMD. Among sociodemographic aspects, schooling and income seem to play a relevant role in child development. Children from families that have lower purchasing power and whose parents have lower levels of education tend to have delays in cognitive and motor development throughout the first year of life⁽²⁹⁾.

Limitations of the study

One of the study's limitations was the absence of sociodemographic or clinical variables of caregivers in the final logistic regression model, opening space for new studies with this purpose. Considering the influence of locoregional issues on the knowledge of caregivers and the childhood NPMD, the results found in this study may be different in other regions/populations.

Contributions to the field of Nursing, Health or Public Policy

The study could distinguish the profile of children/caregivers served in the public health network of the city of Parnaíba, State of Piauí, early detect children with delay alerts, guide caregivers of children with suspected development in the investigation of possible developmental delay, ascertain the level of knowledge of caregivers about child development, and relate which variables are associated with better or worse development.

We believe in the potential of the research to support actions for the promotion and prevention of diseases by health professionals, including nurses, within the scope of child care, family, and community. There is a hope that the results found can serve as a stimulus for further research in the area, investigating which ways can improve child health and development.

CONCLUSIONS

This study found that the knowledge of caregivers about child development is directly related to the neuropsychomotor development of children: the higher the level of knowledge, the greater the probability of adequate development. It concluded that the hypothesis of the research was partially accepted since it was possible to observe the positive influence of the caregivers' knowledge on the child's development independently, as well as the presence of clinical variables of the child (exclusive breastfeeding and gestational age). However, there was no influence of sociodemographic or clinical variables of caregivers on the children's NPMD.

Among the independent variables related to better development, the study highlights the child's age, exclusive breastfeeding, the importance of the up-to-date vaccination record, and the caregivers' level of education. All these factors had a positive impact on the health of the child. To that end, it encourages actions related to health education. These actions should include the knowledge of caregivers about child care and its developmental milestones, in addition to encouraging exclusive breastfeeding and vaccination.

This research is of great importance since most of the studies does not discuss the caregivers' understanding about the development of their children, nor the attitudes of care for their promotion. The lack of knowledge of health professionals about the way that caregivers think decreases the ability to respond satisfactorily to their demands and, in a way, may cause more insecurities and anxieties.

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