COMMUNICATIVE ABILITIES IN PREMATURE AND EXTREME PREMATURE INFANTS

Habilidades comunicativas de crianças prematuras e prematuras extremas

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ABSTRACT

Purpose: to compare the performance of communicative skills in children born preterm, extremely preterm and typical with chronological age between two and three years. **Methods:** participated in the study 72 children were divided into four groups: 20 preterm infants (GE-I), 16 extremely preterm infants (GE-II) and 36 children (GC-I and GC-II) with typical development, chronological age between two to three years, matched for age chronological and sex. The evaluation consisted of the application of the Protocol Anamnesis and Communicative Behavior Observation. Statistical analysis consisted of "t" Student and Mann-Whitney test (p ≤ 0.05). **Results:** comparing the premature and typical groups (GE-I and GC-I and GE-II and GC-II), regarding communication skills, there were significant differences, despite the heterogeneity in performance of preterm and extremely preterm infants. Comparing the premature (GE-I and GE-II) showed no significant differences, however, GE-I got superior performance in all categories, except for category gestures. The categories of lower occurrence for GE-I were: respect shift change, participate and maintain dialogic activity. For GE-II were: participate and maintain dialogic activity, perform complex orders, and start respecting turn-taking, report functions, provide and produce sentences. **Conclusion:** there were significant differences in communicative performance of preterm and extremely preterm, as compared to typical children, but there were no significant differences when comparing the preterm groups. Although the results indicate that the premature groups tend to delay the development of communication skills, but the groups have not shown to be homogeneous.

KEYWORDS: Infant, Premature; Language; Child Development, Language Development

■ INTRODUCTION

The fragility of premature newborns contributes to the eminent possibility of risks, harms and/or varied sequels with different consequences and interventions in the child development process. Thus, the prematurity is considered a biological risk factor for the typical development[1-7].

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By definition, preterm or premature newborns are all babies born with a gestational age (GA) under 37 weeks (< 259 days) and children under the weight are all those born alive with a weight under 2.500 grams at birth[8]. The ones born with a GA under 30 gestational weeks are considered extreme premature[9].

The extreme premature are deprived of a critical period of intrauterine growth. From a structural viewpoint, the premature birth, depending on the GA, may interfere, specially, in the glial proliferation phases, neuronal migration and its organization, indicating the possibility of a change in brain organization. Thus, the prematurity tends to interfere in the brain maturation processes leading to anatomical and/or structural changes, which result in functional deficits[1,10-13]. Such maturation processes will be directly connected to the interference of different

environmental factors[13]. A study[14] showed that even without a brain injury, the prematurity may affect the linguistic development until the end of the preschool years and, probably, further on.

In prematurity, there is a risk of global developmental delay with interferences in the motor, cognitive, personal-social and language areas[3,5,6,13,15-18].

Studies have reported that premature children may show delay in receptive language and in expressive language[2,19]. Regarding the communicative abilities, literature also shows the affected areas in premature refer to linguistic abilities, to vocabulary, to grammar and phonological awareness, which are usually less developed when compared to the development of children who were born at term[3,14-16,19-31].

Given the above, this study purpose was to compare the development of communicative abilities in children who were born premature, extreme premature and typical children with chronological age between two and three.

■ METHODS

This Project was approved by the Ethics Committee in Research on Humans under the number 035/2011. All requirements which rule the Resolution 196/96 on Ethics in Research on Human Subjects of the National Commission on Ethics in Research (CONEP) were respected. The legal representatives became aware of the Project content and signed the term of voluntary and informed consent (VICT) before the beginning of data collection.

The participants in this study were divided in four groups. There were 20 premature in the experimental group EG-I 20 and 16 extreme premature in the EG-II. The control group CG-I was compounded of 20 children with typical development and the CG-II was compounded of 16 children with typical development, matched to the experimental groups for chronological age and gender.

The inclusion criteria for EG-I and EG-II were:
- Have a history of prematurity (EG-I) and extreme prematurity (EG-II);
- Be aged between 24 and 36 months (chronological age);
- Do not show hearing loss for the Newborn Hearing Screening;
- Do not show vision loss which hindered the fulfillment of the proposed procedures.

The inclusion criteria for the CG-I and CG-II were:
- Be born at term;

- Show a typical global development;
- Match for gender and chronological age with the experimental groups (EG-I and EG-II);
- Do not show hearing loss for the Newborn Hearing Screening;
- Do not show vision loss which hindered the fulfillment of the proposed procedures.

The assessment consisted of the following tools:
- Anamnesis Protocol containing information on the identification, gestation, birth and child development to date;
- Communicative Behavior Observation – CBO[32]. In a structured environment and in semi structured situations, the participants engaged in interactional activities, in which they were offered concrete objects in order to verify their actions and interactions. Ludic materials (toys) were used, such as: dolls, balls, logic blocks, farm animals, car miniatures, furniture and household utensils. The situations were filmed for later analysis. The filming time ranged from 40 to 50 minutes.

From the recordings, the answers were analyzed to verify the occurrence of the communicative categories: Interaction with the examiner; Communicative intention; Eye contact; Oral productions (vocalizations); Productions of words; Production of phrases; Use of gestures; Respect to turn taking; Initiation of the turn; Engagement in dialogic activity; Maintenance of dialogic activity; Understanding of concrete situations; Fulfillment of simple orders; Fulfillment of complex orders; Symbolic play; Objects exploration; Functionality to objects; Attention span; Interest in toys; Informational function; Protesting function; Requesting function; Offering function; Imitating function.

The analysis of the communicative behavior categories were calculated according to the following criteria:
0 – did not show;
1 – showed in restricted situations of self-interest;
2 – showed in any situation.

The sum of the analysis categories, obtained after the recording analysis, was done for the statistical treatment. Considering the total of items and analysis criteria, the maximum score sum was of 46 points, considering the participants chronological age.

Casuistic characterization:
Regarding the gender, the groups EG-I and CG-I were composed of 40% female and 60% male subjects. The chronological age ranged from 24 to 36 months (for EG-I: a mean of 30,3 months and for CG-I: a mean of 30,4 months).

In the EG-I, the Gestational Age (GA) ranged from 31 to 36 weeks (a mean of 34,5 weeks), with birth weight ranging from 1200g to 3080g (a mean of 2247g). In the CG-I, the GA ranged from 37 to 41 weeks (a mean of 38,9 weeks), with birth weight ranging from 2615g to 3780g (a mean of 3274g).

The groups EG-II and CG-II were composed of 56,25% female and 43,75% male subjects. The chronological age ranged from 24 to 36 months (for EG-II: a mean of 29,1 weeks and for CG-II: a mean of 29,1 months). In the EG-II, the GA ranged from 26 to 30 weeks (a mean of 28 weeks) and birth weight ranging from 590g to 2205g (a mean of 1240g). In the CG-II, the Gestational Aged ranged from 37 to 41 weeks (a mean of 38,9 weeks), with birth weight ranging from 2700g to 4800g (a mean of 3432g). The data on weight and GA were taken from maternity documents in possession of the family members.

Regarding the neuropsychomotor development, 40% of the EG-I and 62,5% of the EG-II showed delay in the neuropsychomotor development (DNPMD) . In the EG-I, 35% and in EG-II, 93,75% participate or have participated in stimulation processes (sensorial therapies, physiotherapy, speech audiology or occupational therapy). Regarding schooling, 60% of EG-I, 30% of CG-I, 56,25% of EG-II and 50% of CG-II do not attend school.

It´s worthy to inform that no measures to correct the chronological age in the premature and extreme premature subjects were performed, since literature shows the corrected age for prematurity must be applied in children of chronological age until 24 months.

The data analysis was performed in a descriptive way and through the application of statistical tests as follows: the "t" Student Test was used when the groups had a normal distribution. The Mann-Whitney Test was used when at least one of the groups did not have a normal distribution. The significance level of $p \leq 0,05$ was adopted.

■ RESULTS

Table 1 shows the mean, minimum, maximum and standard deviation values in percentage, and "p" values, in comparison between EG-I and CG-I, as to the Communicative Behavior Observation (CBO), by the application of the Mann-Whitney Test. The significance level adopted was $p \leq 0,05$.

Table 1- Results of the Communicative Behavior Observation comparison between EG-I and CG-I

Group	Mean	Mín.	Max.	Standard Deviation	Value of "p"
GE-I	28,4	2	46	16,6	0,007*
GC-I	41,95	21	46	7,14	

Legend: EG-I: Experimental Group I : CG-I: Control group I
Mann-Whitney Test
* = statistically significant

Table 2 shows the mean, minimum, maximum and standard deviation values in percentage, and "p" values, in comparison between EG-II and CG-II, as to the Communicative Behavior Observation (CBO) by the application of the "T" Student Test. The significance level adopted was $p \leq 0,05$.

Table 3 shows the mean, minimum, maximum and standard deviation values in percentage, and "p" values, in comparison between EG-I and EG-II, as to the Communicative Behavior Observation (CBO) by the application of the "T" Student Test. The significance level adopted was $p \leq 0,05$.

Table 2 - Results of the Communicative Behavior Observation comparison between the EG-II and the CG-II

Group	Mean	Mín.	Máx.	Standard Deviation	Value of "p"
GE-II	24,7	2	46	13,75	0,001*
GC-II	42,88	27	46	5,15	

Legend: EG-II: Experimental Group II : CG-II: Control Group II;
"T" Student Test
*: statistically significant.

Table 3 - Results of the Communicative Behavior Observation comparison between EG-I and EG-II

Group	Mean	Mín.	Máx.	Standard Deviation	Value of "p"
GE-I	28,4	2	46	16,6	0,468
GE-II	24,7	3	46	13,7	

Legend: EG-I: Experimental Group I : EG-II: Experimental Group II
"T" Student Test

Figure 1 shows the descriptive analysis for the comparison between the results obtained by the EG-I and CG-I participants during the assessment of the CBO tool.

Figure 2 shows the descriptive analysis for the comparison between the results obtained by the EG-II and CG-II participants during the assessment of the CBO tool.

Figure 3 shows the comparison between the means of each assessed item with the CBO tool reached by the EG-I and EG-II participants during the assessment.
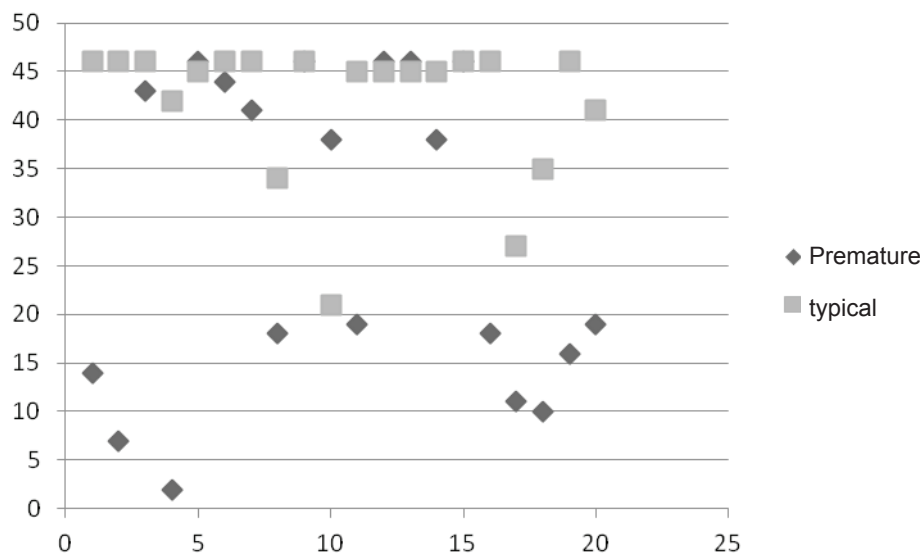

Figure 1 – Comparison between the performance of EG-I and CG-I in the Communicative Behavior Observation.
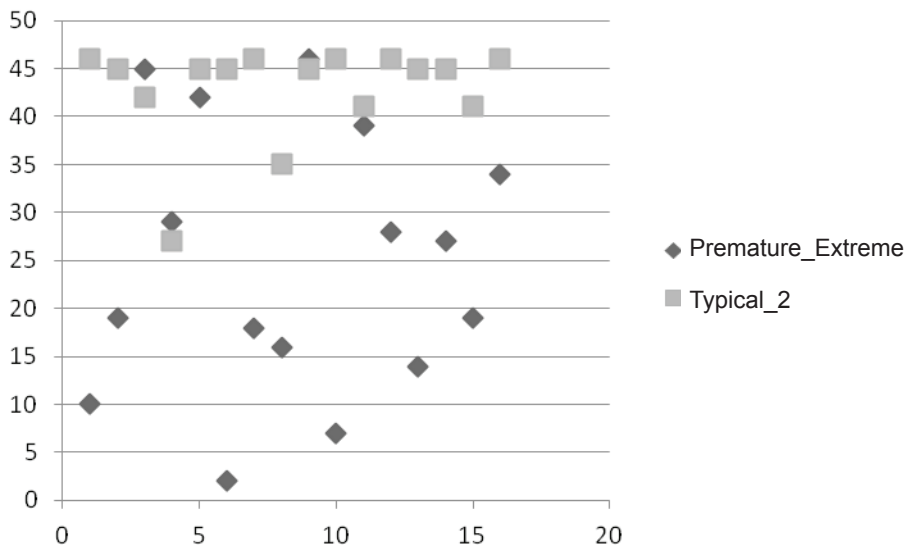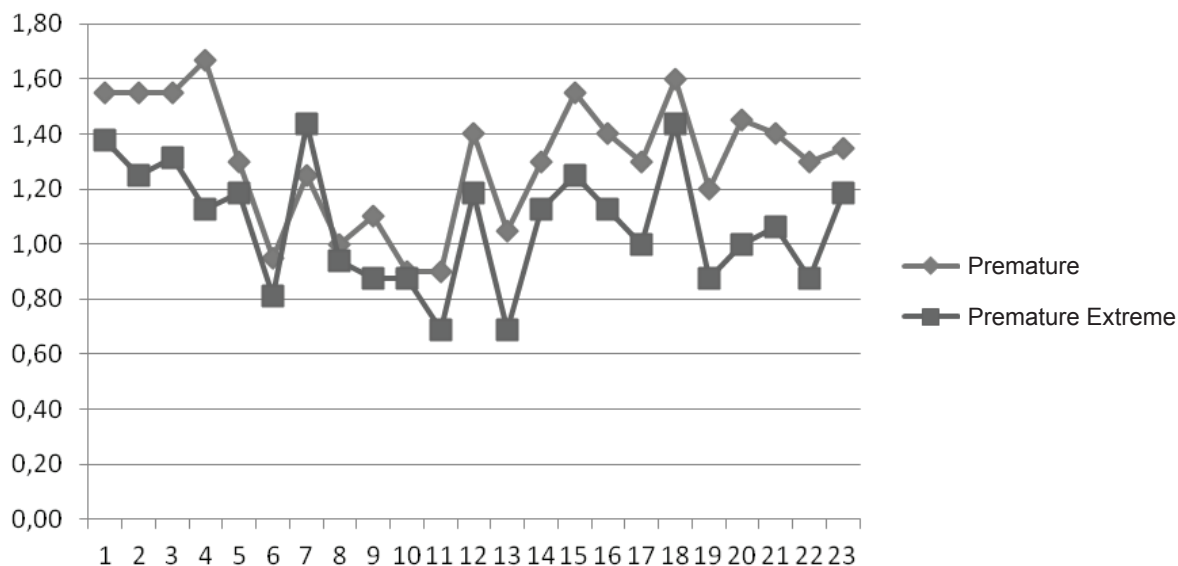
Figure 2 – Comparison between the performance of EG-II and CG-II in the Communicative Behavior Observation.

1- Interaction with the examiner; 2- Communicative intention; 3- Eye contact; 4-Oral productions (vocalizations); 5- Production of words; 6- Production of phrases; 7- Use of gestures (indicative or representative); 8- Respect to turn taking; 9- Initiation of the turn; 10- Engagement in dialogic activity; 11- Maintenance of dialogic activity; 12- Fulfill simple orders; 13- Fulfill complex orders; 14- Symbolic play; 15- Objects exploration; 16- Functionality of objects; 17- Attention span; 18- Interest in toys; 19- Inform; 20- Protest; 21- Request; 22- Offer; 23- Imitate.

Figure 3 – Comparison between EG-I and EG-II in each assessed item in the Communicative Behavior Observation.

■ DISCUSSION

Studies have reported premature and mainly extreme premature children may show global development alterations and delay in language development[3,5,6,13-31].

In this study, as confirmed in the casuistic characterization, 40% of EG-I and 62,5% of EG-II showed delay in the neuropsychomotor development.

The delay in motor development may narrow the children experiences for interacting with people, objects and events, the handling of objects, the repetition of actions, the domain of the own body and body scheme. Thus, this child may lose concrete opportunities to enable his repertoire, causing gaps in the perceptive, cognitive, linguistic and social areas with a repercussion in the other dimensions of the child development[7,23].

Figure 1 and figure *2* point statistical differences obtained in the Table 1 and in the Table 2 as to the Communicative Behavior Observation. Although the premature groups have shown statistically significant performances, a variety in the performances of the participants was verified when they were compared to the typical group, that is, while the minimum scores of the experimental groups (EG-I and EG-II) were 2 and 3 points, the scores of the control groups (CG-I and CG-II) were 21 and 27, respectively.

Regarding the maximum values, EG-I and EG-II children obtained compatible scores with their pairs (46 points). This variability may as well be confirmed by the analysis of the mean and standard deviation values. There were no statistical differences in the comparison between EG-I and EG-II (Table 3).

Despite the high probability of developmental alterations, the subjects who were born premature and with a very low weight don´t constitute a homogeneous group. It´s clear that the relation between prematurity and low birth weight with the global development impairment cannot be understood as a direct relation of cause and effect, but, on the contrary, it shows the need of identifying the protector mechanisms, which are capable of minimizing and even neutralizing the potential risk effects to the development[10].

Although many studies describe that premature and mainly extreme premature children may show a slower language development rhythm [1,2,14,15,17,21,25,26,29], a study[2] showed that language development disorders may occur at about 30% and another study[19] reported delay in the development of the expressive language in 26% of the casuistic.

Authors[28] showed there were no differences found between the groups of premature and typical two year old children regarding the development of the vocalizations when the statistics was done through the corrected age for the premature. Others[20] pointed that premature children may have delays or transient deviations, drawing attention to the importance of guidelines to the families stimulate children in the language acquisition process.

It´s necessary to point that the prevalence of language development alterations in premature is related to numerous variables, such as the casuistic size and studies methodological characteristics, prematurity and extreme prematurity, very low weight, history of complications, morbidity indicators, environmental factors, use of corrected age, among others[2,6,13,17].

The environment may favor the receptive development and expand the vocabulary and its use, that is, if the family, or other social environments, requests the expression of more elaborate linguistic contents, the child will have the possibility of not only acquiring the verbal label, but also expanding their linguistic structures, becoming, according to their capacity, an effective communicator.

One of the variables refers to the use of the corrected age calculus for the analysis of the premature development performance. Studies have used the corrected age for prematurity to verify the performance for functional abilities in varied developmental areas[22,28]; however, it is worthy pointing that there is no consensus regarding the use of the corrected age for the assessment of the prematurity effects in different development dimensions[18,23]. This is justified, since the use of the corrected age could put premature children in normative baselines, in a first analysis and, then, postpone preventive measures for a full development[23].

When the comparative analysis of the CBO items (Figure 3) between the experimental groups (EG-I and EG-II) is done, the mean score of the EG-I is always higher than the mean score of the EG-II for the assessed abilities, except for the "use of indicative or representative gestures" category, which was more used in the EG-II.

The nonverbal communication, through the use of gestures, provides an important basis for the arising of oral language. As could be assumed, the use of gestures isn´t necessarily a disadvantage during the oral language learning, since they perform an important role in the early communicative development, independently of the oral production be already available. This may suggest the conceptual knowledge is present even before the child is able to express it in the speech. Yet, authors[33] have shown that the lexical competences at 12 months, together with gestures and actions at 18 months are predictors of the production of words at 24 months, with a strong aid to the understanding of words.

The gesture may play the role of a bridge between the understanding and the production of words, as well as in the connection between the receptive and expressive vocabulary[34]. It´s worthy pointing that children with delay in the expressive abilities may compensate their lack of linguistic resources for speech abilities through the production of gestures.

Literature points to a great similarity in the gesture development course, in the initial stages of communicative development, showing a tendency of a lower use of gestures as children acquire better communicative conditions through oral language[26,33,34].

The results of a longitudinal study, which followed the cognition and language performance in premature children of very low weight, highlighted that the expressive language occurred later in premature newborns, besides pointing that the delay persisted through the sensorimotor period until the preoperational period[24].

In Figure 3, it´s also possible to verify that the least occurring categories for EG-I were respect to turn taking, engagement in dialogic activity and maintenance of the dialogic activity. The least occurring categories for EG-II were engagement in dialogic activity, maintenance of the dialogic activity, fulfillment of complex orders, respect to turn taking and initiation of turn, production of phrases, inform and offer assistance. We highlight that even with these differences in the categories individual analysis, the statistics did not show significant differences among the groups. It is inferred this has happened due to the reduction of the use of linguistic abilities, characterizing performances below the expected for both groups.

Authors[30] have shown that a delay in the language development of premature children can already be observed in the pre linguistic period, with consequences for the lexical development, which has also been described as delayed during the first three years of life. A longitudinal[26] study done with premature newborns with GA under 32 weeks indicated that about 14% of the premature babies of the casuistic were unable to match the words and that the grammar difficulties tend to become marked during the second and third years of age. Other studies corroborate with these findings[25]. Restricted vocabulary, difficulties to match words, inform among other communicative abilities in children aged from two to three are indicative that the language development is occurring in a slower rhythm with consequences in the interactive abilities and, mainly in dialogic activities.

The weight and GA influence in the language acquisition and in the neurodevelopment of children who were born premature correlates significantly to the delay in language acquisition and alterations in the neuropsychomotor and cognitive performance, according to literature[21,22]. This study did not perform the correlation among these variables. Despite the premature and extreme premature born subjects show a high probability of alterations in the communicative development, caution is necessary regarding the deterministic linear prediction between the presence of prematurity at birth and the child future as to development

Another worthy aspect refers to the individual influences of prematurity and environment, as this phenomenon brings different consequences, according to the numerous intercurrences and indicators of comorbidities, which would also justify the heterogeneity for the consequences of the child development. Further studies must follow the communicative abilities development of premature, in a longitudinal way as to contribute for the knowledge on the acquisition of the development abilities. Many studies have reported the importance of the longitudinal following for premature and extreme premature born children[15,18,20,23]. Furthermore, the following of these children, who have a risk of interference in their communicative performance, will favor the understanding the trajectory of their development, which is determined by complex interactions, which must be understood in order to minimize the deleterious effects of prematurity for the communicative development.

■ CONCLUSION

In the comparison between the premature (EG-I and EG-II) and typical (CG-I and CG-II) groups regarding the communicative abilities, there were significant differences despite the heterogeneity in the premature and extreme premature performance.

There were no significant differences in the comparison between the premature and extreme premature groups (EG-I and EG-II). Although the results point that the premature groups tend to a delay in the communicative abilities development, the groups did not show to be homogeneous.

RESUMO

Objetivo: comparar o desempenho das habilidades comunicativas, de crianças nascidas prematuras, prematuras extremas e típicas de idade cronológica entre dois e três anos. **Métodos:** participaram do estudo 72 crianças distribuídas em quatro grupos: 20 prematuros (GE-I), 16 prematuros extremos (GE-II) e 36 crianças com desenvolvimento típico (GC-I e GC-II), de idade cronológica entre dois a três anos. Houve pareamento quanto à idade cronológica e sexo. A avaliação constou da aplicação do Protocolo de Anamnese e Observação do Comportamento Comunicativo. O tratamento estatístico constou do Teste "t" *Student* e do Teste de Mann-Whitney (p ≤ 0,05). **Resultados:** na comparação entre os grupos de prematuros e típicos (GE-I e GC-I e GEII e GC-II), quanto às habilidades comunicativas verificou-se diferenças significantes, apesar da heterogeneidade no desempenho dos prematuros e prematuros extremos. Na comparação entre os prematuros (GE-I e GE-II) não foram observadas diferenças significantes, entretanto, GE-I obteve desempenho superior em todas as categorias, exceto para a categoria uso de gestos. As categorias de menor ocorrência para GE-I foram: respeitar troca de turno, participar e manter atividade dialógica. Para o GE-II foram: participar e manter atividade dialógica, realizar ordens complexas, iniciar e respeitar troca de turno, funções de informar, oferecer e produzir frases. **Conclusão:** houve diferenças significantes no desempenho comunicativo das crianças prematuras e prematuras extremas, quanto comparadas às crianças típicas, mas não houve diferenças significantes na comparação entre os prematuros. Apesar dos resultados indicarem que os grupos de prematuros tendem ao atraso no desenvolvimento das habilidades comunicativas, os grupos não demonstraram ser homogêneos.

DESCRITORES: Prematuro; Linguagem; Desenvolvimento Infantil; Desenvolvimento da Linguagem.

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Appendix
Communicative Behavior Observation (CBO) – (Ferreira, 2010)

Name: _____

Exam date: _____   Age: _____

1. Interaction with the examiner: _____

2. Communicative Intention: _____

3. Eye contact: _____

4. Oral productions (vocalizations): _____

5. Production of words: _____

6. Production of phrases: _____

7. Use of gestures (indicative or representative): _____

8. Respect to turn taking:_____

9. Initiation of the turn: _____

10. Engagement in dialogic activity: _____

11. Maintenance of dialogic activity: _____

12. Fulfill simple orders: _____

13. Fulfill complex orders: _____

14. Symbolic play: _____

15. Exploration of objects: _____

16. Functionality of objects: _____

17. Attention span: _____

18. Interest in toys: _____

19. Inform: _____

20. Protest: _____

21. Request: _____

22. Offer: _____

23. Imitate: _____

Score:

0 – did not show;

1 – showed in situations restricted to self interest

2 – showed in any situation.