

Early childhood education and motor intervention: a view based on the bioecological theory of Bronfenbrenner

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Abstract: This study investigated the relationship between the enrichment of the environment context of day care centers and the law in force. Three case studies were conducted with babies in the paradigm of the Bioecological Theory. The results showed that the babies presented new manipulative skills, postural control and social interaction. However, the quality of the care offered in the daycare was restricted to hygiene and nutrition. The intervention can be implemented in the daycare; however, it is necessary to enforce the law regarding the training of the educators and the child/educator ratio in order to effectively transform the assistencialist character of the early child education.

Keywords: Day Care Centers. Legislation as a subject. Early intervention(Education).Early childhood education.

1 INTRODUCTION

This research is the result of a growing concern about early childhood education with regard to the education

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character and the development of infants who attend day care centers in the first year of life. Several environmental factors influence child development, like adequate nutrition, social conditions (drinking water, adequate sanitation) and quality of education. Investments in children are more efficient and provide higher returns than any other investment by the government, as that investment contributes to social equity and economic rise (SANTOS, 2004). However, these factors still do not get due attention from the society as a whole, since in the context of nurseries and day care centers we can observe a lesser concern with the education needed for the babies' development (ALMEIDA, VALENTINI, Lemos, 2005; ARNS, 1998; Huijbregts, LESEMAN, TAVECCHIO, 2008).

Several studies show the damages caused by delay in early childhood development, which become social preoccupations (Almeida, 2004; ALMEIDA, VALENTINI, WARRIOR, 2005; Bombard, 2008, Ramey, Ramey, 1998, Ramey, Bryant, SUAREZ, 1990; RECH, 2005; Wasik, Ramey, Bryant, 1990). Delays in early childhood are related to school dropout, teenage pregnancy and juvenile delinquency (Ramey, Bryant, SUAREZ, 1990). Considering that motor development depends on the interaction between the individual, the environment and the task (KREBS, 1995; Rose, 1997), an inappropriate, inhibiting, or not very stimulating environment can impact negatively on child development (RUMOR, 2003; Ramey, BRYANT, SUAREZ, 1990). In a dynamic view of child development, the need to know the nature, innate or acquired, that determines how a child grows and develops becomes irrelevant, for if heredity determines the human potential, it is the means that mediate the achievements of the human being (Bronfenbrenner, 1996; GALLAHUE, OZMUN, 2001; HAYWOOD, GETCHELL, 2004; NEWELL, 1986).

The interactions (hereditary and environmental) influence the child's major changes, causing his/her

development to occur in different rhythms and intensities (BEE, 1996; PAPALIA, OLDS, 2000). Considering that children know the world using motor operation, their overall development will depend on the success of their experience with it at this early stage. Intervening in the daycare or school kindergarten, making it a stimulating and educational environment, may favor the development of the children. Intervention in this age group seeks to modify the quality of stimulation provided to children by changing the immediate environment, or creating a new system in which the child is inserted. In both cases, various proposals and new tasks are added to the day-to-day life. As these stimuli modify the child's overall development, they alter the manner in which the child interacts with the environment. The change in the form of interaction may favor the creation of a greater variety of stimuli and curiosity that will induce the child to discoveries. These discoveries allow the baby to influence his/her environment, allowing possible changes in the roles (BEZIER, Hunsinger, 1994; BROFENBRENNER, 2002; KREBS, 2003). This complex dynamic interaction between the attributes of the developing individual and the pressures of the context in which development takes place, and that happens over time, is shown (Figure 1) in the bioecological model (BROFENBRENNER, 1995; BROFENBRENNER, CROUTER, 1983; BROFENBRENNER, MORRIS, 1998; BROFENBRENNER, LUSHER, 1995).

In Brazil, the direction of research based on the bioecological theory focuses mainly on descriptive studies with school-age children (KREBS, Zuchetto, 2008; Vieira, 2003; COPETTI, 2003, Berleze, 2002; COPETTI; KREBS, 1997). Some Brazilian studies (e.g. Melchiori; ALVES; SOUZA; Bugliani, 2007, Bering, NEZ, 2002) investigated infants and their context, taking into consideration their microsystem (daycare, family environment). Unfortunately, the literature lacks studies that relate their results to other systems present in the bioecological model (e.g. mesosystem, exosystem, macrosystem) and interventional studies with

infants within this theoretical perspective. Interventions with infants tend to focus on the dynamics of various interventions, and on their influence in the motor progress (BOMBARD, 2008; ALMEIDA, 2005; RECH, 2005). In this perspective, portraying the reality of the socio-cultural context in which children are inserted, and producing reliable information, that may help identify problems as early as possible, reinforce the importance of this research. The implementation of strategies to be incorporated into the family organization and day care center can result in effective actions that can cause positive changes in the babies.

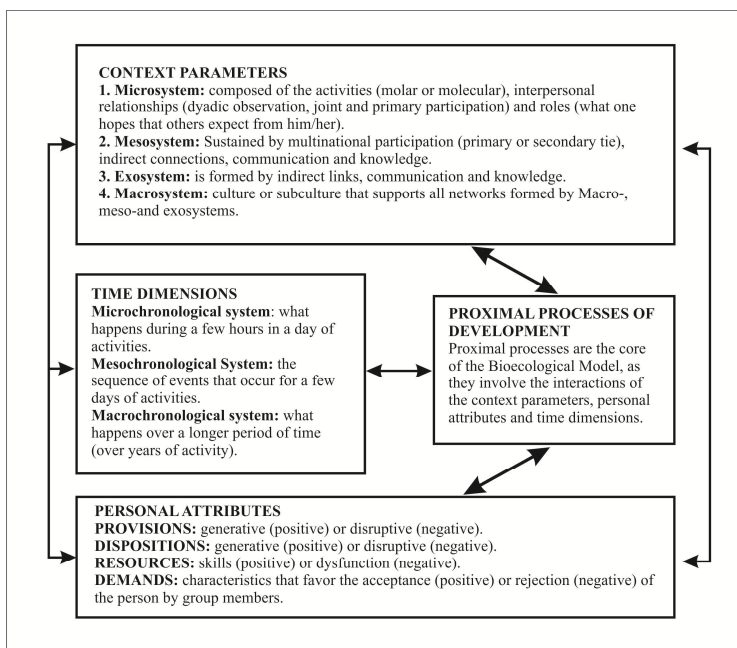


Figure 1. Model of interaction of the elements of Bronfenbrenner's Bioecological Theory (KREBS; ZUCHETTO, 2008)

One of the determining factors for child development are the social circumstances and the possibility of choice to which the family has access. Thus, this study investigated the relationship between the microsystem, the day care center the

child attends, enriched by a motor intervention, and the macrosystem, which involves the laws governing these day care centers and public policy for infants. To achieve this objective, we sought to understand how the educational potential of the microsystem relates to the educational guidelines established by the legislation in force.

2 MATERIAL AND METHODS

The methodological procedures in this study are supported on the verification and discovery modes of the bioecological model (Bronfenbrenner, 2005). Regarding the verification mode, this study implemented alternative hypotheses and research designs to verify the real applicability and validity of results obtained and their replicability in the baby's everyday life. As for the discovery mode, the empirical part of this research was based on three case studies with infants who participated in a motor intervention in the day care center in their first year of life. With this design regarding the discovery mode, we seek to provide a scientific basis for designing more effective social policies and programs, which may counteract the new and emerging disruptive influences on human development.

2.1 DELIMITATION AND INTERPRETATION OF THE CONTEXT PARAMETERS OF THE STUDY

The study of child development interpreted by bioecological context parameters comprises: a) the developing child, whose growth is always in constant progress, restructuring his/her surroundings; b) reciprocity, when an interaction occurs between the child and the environment, that is, the environment influences the child development, and c) the interconnections between these environments and external influences from the wider entourage. These environments are called micro-, meso-, exo- and macrosystem. They are arranged in concentric circles, from the innermost to the

outermost area, and all of them are in the time dimension (Bronfenbrenner, 1996). The microsystem is related to the baby's more immediate system, the environment in which he/she participates actively, like the day care center, for example. The mesosystem comprises the interrelations among two or more micro-environments in which the baby is active - the family and the daycare. The exosystem includes the interconnections between two or more environments, and the child does not participate at least in one of these environments. But the environment in which the child participates indirectly affects her/his development, and as an example we can cite the work of parents. The macrosystem is the last level of the model, and can be explained as the broader social context, which influences the child's development. An example of this level is the public health and education systems offered in our country. Based on these examples, we designed the model for the analysis used in this study. This model is shown in Figure 2.

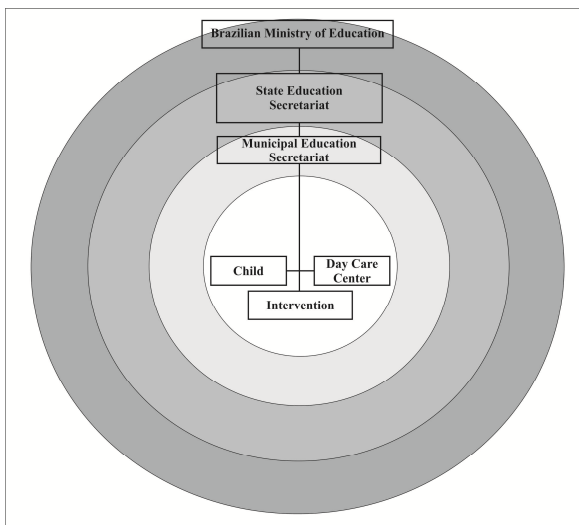


Figure 2. The contexts of early childhood education in this study based on Bronfenbrenner Bioecological Theory.

In the model presented in Figure 2, we can see the interactions built as a result of the intervention babies received in the daycare microsystem. This microsystem maintains a systemic network with the regional, state and federal public policies, represented by the Municipal and State Education Secretariats and Ministry of Education, respectively. The Union exercises its powers in the field of education through the Ministry of Education with the following actions: formulation of national policy; national coordination (coordination with other agencies and ministries that have policies and programs for children from 0 to 6 years old); establishment of general guidelines; technical and financial aid for the states, the Federal District and the municipalities; collection, analysis and dissemination of educational information; regulation and standardization by the CNE (National Education Council); provision of higher education for teachers; research promotion. The states exercise their powers through the State Education Secretariat, with the following actions: formulation of state policy, state coordination; execution of state actions; technical and financial aid for municipalities; regulation by CEE (State Board of Education – *Conselho Estadual de Educação*); authorization, recognition, accreditation, inspection, supervision and evaluation of the establishments of its education system, provision of a Normal school to form teachers, at a high school level. The municipality exercises its powers through the Municipal Education Secretariat with the following actions: formulation of municipal policy, coordination of municipal policy, execution of programs and actions; regulation by CME (when there is a Municipal Education Council); authorization, recognition, accreditation, supervision, and evaluation of the establishments of its education system, continuous training of teachers; research promotion.

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2.2 SAMPLING

The sampling is of a non-probabilistic, intentional type, chosen among the population of children in day care centers linked to the public and philanthropic network of Porto Alegre. The day care centers authorized the use of their

facilities through an institutional authorization. From a population of forty infants from 6 to 8 months old, who had participated in a prior study of motor intervention (ALMEIDA, 2004), we chose three babies. These three babies were chosen because they remained with motor delays after the first study, showing the need for continued intervention. To ensure anonymity, the participant babies had their real names replaced by fictitious names. The term of free and informed consent document was obtained for each participant, and the study was approved by the UFRGS ethics committee (Case No. 2003109).

2.3 DATA COLLECTION PROCEDURES AND INSTRUMENTS USED

The three infants selected for this study were evaluated before and after the intervention period by means of the Scale of Child's Behavioral Development in the First Year of Life¹ (PINTO; VILANOVA; VIEIRA, 1997). To ensure the objectivity of this evaluation, it was carried out by three assessors, two being independent of the researcher. There was a 100% agreement among them. The behaviors assessed by the Scale of Child's Behavioral Development in the First Year of Life were: a) axial spontaneous non communicative - posture and movement, drag, crawl, walk, b) axial spontaneous communicative- verbal communication, emission of guttural vowels, and the baby repeats the same syllable; c) axial stimulated non-communicative- if the baby tries to locate the sound and avoids strangers d) axial stimulated communicative- motor response to a verbal or bodily stimuli, which indicates if the baby plays "peek-a-boo" and reacts to bodily games; e) appendicular spontaneous non-communicative- manipulation of objects, if the baby takes his hand to his mouth, she/he has simple grip, pinches, f) appendicular spontaneous communicative - touches the other, if the baby touches the glasses, face and hair of adults; g) appendicular stimulated

¹Escala de Desenvolvimento do Comportamento da Criança no Primeiro Ano de Vida

non-communication – manipulation of objects presented to him/her, if the baby tries to grab a suspended object, balances sonorous toys, rattles; h) appendicular stimulated communication - response to verbal requests, gives "goodbye", responds to simple requests, pets. These eight items were rated on a "Likert" - type scale with five levels: 1) delay, 2) risk, 3) regular, 4) good 5) excellent. In the evaluation, we used toys (rattles, wooden toy truck block set, mirror, etc.) in order to investigate the presence of different motor skills through play activities.

2.4 IMPLEMENTATION OF THE INTERVENTION PROGRAM

The intervention program was performed three times a week, for two months, with a total of 18 interventions due to the absence of the babies. During all stages of the study, the infants were videotaped. All remarks made during the intervention and the footage were recorded in a journal that served as support for analysis and discussion of results. The diary describes the observations made during the intervention on motricity, interaction, babies' behavior and operation of the daycare. The basis for the descriptions of daily records relating to motor development was based on the Alberta Infant Motor Scale (PIPER; DARRAH, 1994). The interventions were held three times a week, in the daycare, and the session was divided into three parts: a) visual pursuit, b) sensory-motor operation c) locomotion. The visual pursuit was performed with colorful rattles, stuffed or rubber animals and it basically consisted in showing the toy and moving it around in order to provoke interest (generative disposition) in the baby, who could follow the movement with his/her eyes and try to reach it (competence or dysfunction). If the baby reached for and grabbed the toy, it was put into his hands. Then we would begin another movement with another toy, diverting his/her attention from the "old" toy, allowing the continuation of the dynamics in the proposed period. The sensorimotor exploration consisted mainly in manipulating objects, and it was executed as follows: toys in different shapes, colors and

textures were presented to the baby; if the baby lost interest in the first toy or had satisfactorily explored the possibilities of grasping it, a new toy would be offered. To perform the locomotion, the baby was placed in prone position and stimulated with toys in her/his line of sight. Then we would place other sonorous toys out of his/her line of vision to create the need for change in posture. The baby was left free to resolve any locomotor (postural control and manipulation) difficulties that appeared during the intervention. When the baby could not independently solve the motor problem, he/she would get help to execute the movement. If, nevertheless, the baby could not achieve his/her goal and presented characteristics of frustration, the problem was temporarily solved, and would be presented again during the session in a different manner.

3 ANALYSIS OF RESULTS

The data was analyzed descriptively and individually, since the study did not aim to compare the babies to each other, but to interpret the effects of intervention in the process of the behavior development of the babies and describe the context of the day care center. The analysis was performed based on triangulation of information collected in the research field, in which we sought to link the legislation to the research's theoretical framework and to the data inscribed in the journal.

3.1 RESULTS

3.1.1 DESCRIPTION OF THE ENVIRONMENT AND THE DAILY ROUTINE OF THE DAY CARE CENTER OBSERVED DURING THE INTERVENTION

The interventions were conducted in two day care centers in Porto Alegre, which receive children from low income homes. The first daycare had an average of 11 babies per caregiver. The babies remained for at least 7 hours a day in

the daycare, which was organized by a large number of volunteers. The teachers had training at a fundamental level. The toys were scarce, and came from donations and fundraising events held mainly by volunteers. The second day care assisted around 8 babies per caregiver and had more toys than the other daycare, which favors the development of infants, but they were not adequate in number and function.

The educators had finished high school but did not have an undergraduate formation. In both day care centers, the space was limited, with only one room, and the babies remained most of the day in the crib, which further limited the possibilities of discovery. The routine of the day care centers was established in accordance with the schedules of feeding and diapering. Upon arrival, the babies received the first meal and then immediately began the first session of diaper changing. When the attendant finished diapering, there was a short break and soon preparations for a new meal began, followed by new diaper change, so that the attendant did not have much time to play and interact with babies.

3.1.2 DESCRIPTION OF THE BABIES' DEVELOPMENT DURING INTERVENTION

The personal attributes diagnosed in the pre-test, as well as skills and motor dysfunctions are presented in detail in Tables 1 and 2, respectively.

	SKILLS	BEHAVIOR DESCRIPTION
João	1- spontaneous communicative axial behavior	(a) repeats his/her own sounds, (b) avoidance reaction
	2- estimated non-communicative axial behavior	(a) removes cloth from the face (b) localizes sound, (c) pursues object 180°
	3- estimated communicative axial behavior	(a) turns when called by name
	4- spontaneous communicative appendicular behavior	(a) hits glasses, nose and hair of adults
	5- estimated non-communicative appendicular behavior	(a) tries to get a suspended object (b) rattles
	6- estimated communicative appendicular behavior	(a) responds to "come", extending the arms, (b) claps hands (c) gives "good bye"

Ana	1- estimated non-communicative axial behavior	(a) smiles and vocalizes to a mirror (b) removes cloth from the face
	2- estimated communicative axial behavior	(a) turns when called by name, (b) plays peek-a-boo (c) reacts to bodily games
	3- spontaneous non-communicative appendicular behavior	(a) in prone position, reaches object, (b) picks up object after dropping it, (c) finds hidden object, (d) uses intermediary object
	4- spontaneous communicative appendicular behavior	(a) hits glasses, nose and hair of adults
	5- estimated non-communicative appendicular behavior	(a) removes big rolling pins, (b) removes small rolling pins, (c) puts objects in container
	6- spontaneous communicative appendicular behavior	(a) responds to "come", extending the arms, (b) clap hands, (c) performs simple actions upon request
Maria	1- spontaneous communicative axial behavior	(a) smiles, (b) repeats his/her own sounds
	2- estimated communicative axial behavior	(a) turns when called by name
	3- stimulated appendicular behavior	(a) hits glasses, nose and hair of adults
	4- estimated non-communicative axial behavior	(a) does not smile and vocalizes to a mirror
	5- estimated non-communicative appendicular behavior	(a) Shakes sonorous toys, (b) rattles

Table 1. Personal attributes diagnosed in the pre-test as Skills

	DISFUNÇÃO	DESCRIÇÃO DO COMPORTAMENTO
João	1. spontaneous non-communicative appendicular behavior	(a) could not reach objects when in prone position, (b) did not pick up objects when they fell, (c) did not transfer objects from one hand to the other, (d) did not hold two rolling pins in one hand
	2. spontaneous non-communicative axial behavior	a) did not crawl, (b) did not change his/her position from prone to sitting
	3. estimated non-communicative axial behavior	a) did not repeat the same syllable, (b) did not form words in syllable games
Ana	1. spontaneous non-communicative axial behavior	(a) did not crawl, (b) did not stand with little support, (c) did not change his/her position from prone to sitting, (d) did not walk with help
	2. spontaneous communicative axial behavior	(a) did not emit vowel sounds, (b) did not repeat the same syllable, (c) did not present avoidance reaction to strangers

Maria	1. spontaneous non-communicative axial behavior	(a) did not drag, (b) did not sit without hand support, (c) did not pull him/herself to sit (d) did not roll, (e) did not stand with little support
	2. spontaneous non-communicative appendicular behavior	(a) could not reach objects when in prone position, (b) did not use intermediary object, (c) did not keep two rolling pins in one hand, (d) did not remove two small pins, (e) did not put objects in container

Table 2. Atributos pessoais diagnosticados no pré-teste como Disfunções

	FIRST MONTH	SECOND MONTH	END OF INTERVENTION
João	The baby was eight months old and was good-humoured. When he felt frustrated for not being able to reach an object, he gave up trying and looked at the intervisor expecting to receive the object from her/him. The prone position adopted limited manipulation of objects because the baby could not pick up objects that made him withdraw the supporting forearm. The frequency of object manipulation in this position was not very expressive. On the seventh day of intervention, the baby dragged backwards, which made it difficult for him to change direction. The sitting position without support of the arms was maintained safely, allowing the manipulation and exploration of the possibilities of grasping. Falling objects were quite frequent.	The baby reaches prone position with the support of an extending arm. In sitting position, the baby changed his position to prone. He would change sitting position to prone by pushing with the arms, making no use of his legs. During the intervention, the baby started to crawl, which also contributed significantly to exploring the possibilities of movement, since he was able to pursue the object or event that drew his attention more effectively.	The baby kept the position on all fours and, sitting, did not use upper limb support. He showed an increasing interest in the activities, which improved the quality of his movements. Manipulation of objects was more accurate in both sitting and in prone position. There was an increased frequency of falls in the ninth and tenth sessions. Postural control and movement improved significantly, the equilibrium reactions became more defined and efficient. He became more active in interacting with objects and with the intervisor. At the end of the intervention the baby had no delays.

Ana	The baby was nine months old, had difficulty in fixing his gaze on people. The interaction with the interventor happened gradually. She dragged with great efficiency, making use of this form of displacement often and rarely sought the all- fours position. She began to smile more often, to point to the toys and interact more with the environment. The manipulation of objects became more accurate, and the number of falls reduced. She adopted the sitting position without support of the arms, changed her position with ease. She often explored the environment, but not as expected. She hardly fixed her gaze on the interventor, educator, or even on other children. She played mostly alone and fixed her gaze into the void.	She stayed in a modified all-fours position, in which she played, being able to move forward. This position allowed an increasing postural control, as it enabled a dynamic change from prone position to sitting. She demonstrated interest in toys and she manipulated them, but she seemed to be apart from the environment that surrounded her. This feature was minimized over time, as gradually the baby began to interact more actively with the other people.	She walked laterally with support, became efficient in moving in all-fours. The visual pursuit became more active, and rubber toys and rattles had to be replaced. The infant no longer manipulated objects in a prone position, and started to sit to explore the objects. She acquired the ability to move efficiently, so we had to modify the intervention, changing the time of each activity. But we maintained the intervention time of 15 minutes, changing only the distribution of activities in accordance with the interests of the baby. The delay evidenced in the beginning was no longer present.
Maria	Seven months old, interacted with and watched the other people with traces of anxiety. The family, because of their socioeconomic status, dressed her with clothes that were small for her size, which hampered her movements. She did not perform visual pursuit, but fixed her gaze on the interventor. The manipulation of objects was imprecise. She showed displeasure	She began to manipulate objects in the adopted prone position. She sought to maintain the original grasp, and the objects fell often. The baby acquired a sitting posture without upper limb support. This approach enabled an improvement in manipulation, since the baby is no longer dependent on others to remain seated. She started to play with the objects and partly	She started having a greater command of the prone position, being able to roll from prone to supine position. She tolerated the prone position on the penultimate week of intervention, as long as the face of the interventor was in her field of vision, that is, the baby began to tolerate the position because she felt safer and interacted socially. She sat independently and reached objects

	by crying in prone position and her balance and protective reactions were precarious. The displacement of her gaze from the interventor to the object happened gradually, accompanied by improvements in movement quality, in the increase of frequency of object manipulation and in greater interaction with the object. In prone position, weight transfer was uncontrolled and the movement was not very coordinated. When she was sitting, the body began to seek the middle line, but she did not remain in the position alone.	reduced the fixation time looking at the interventor.	with a rotation. Reaching suspended objects and manipulation in general were done with greater precision. Although the manipulation of toys presented rudimentary features, it was possible to see progress in the movement through the characteristics of bimanual reach and grasp. A reduction in the number of falls of the objects was observed . Maria had no delays at the end of the intervention.
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Table 3. Motor behaviors in the intervention

The babies showed positive changes during the intervention in different behaviors. All age-related behaviors that were not presented at the beginning of the intervention were acquired during the intervention (Table 3).

The babies showed improvement in both object manipulation and postural control. The achievements of postural control and locomotion can be observed in Figure 3. There we considered the session in which the behavior appears for the first time, according to the descriptions of the field journal.

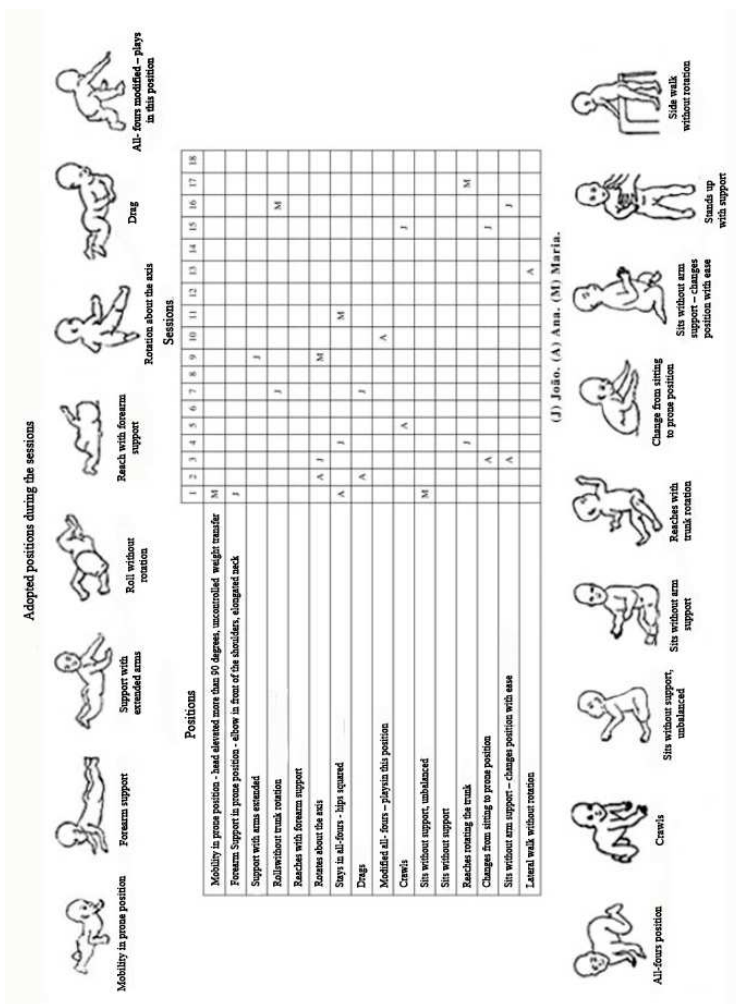


Figure 3. Emergence of behaviors during the intervention sessions
Source: Darrah, 1994.

4 DISCUSSIONS

4.1 THE MICROSYSTEM AND CHANGES IN MOTOR SKILLS

Regarding the context, it was observed that the main function performed by the educators was restricted to supportive care, such as hygiene and health of babies. This role of daycare educators is in agreement with the findings of Arns (1999) and Almeida, Valentini and Lemos (2005), that is, the work is restricted to tasks like diapering and feeding. During feeding, a moment that could be used for interaction and exchange between educator and child, the babies were placed in strollers arranged in a circle, and the educator gave a bottle to each baby. Older children were also in the circle while the educator fed them individually, systematically following the order. Here, the interaction was also impaired, since despite the need to give individual attention, the educator was always paying attention to the group. The moment of changing diapers provided greater interaction between the educator-child dyad. In this situation, the educators talked with the babies and showed more signs of affection. As the teaching materials were scarce, babies who did not freely move depended on the interaction with the educator to manipulate a toy. When interaction between educator and child is restricted, child development is restricted in the institutional environment (Bronfenbrenner, 1995; KREBS, 1995). This was strongly observed in the initial evaluations, in which the participant babies showed significant delays in motor development, which also limited their interactions with the environment.

Despite these initially established delays, which were still prevalent even after previous intervention, individualized and prolonged interventions, performed at the daycare, showed a positive impact on motor behavior. The results of this study are similar to those found by Adams, Valentini and Lemos (2005), who studied children around 9 months old of public day care centers in 10 intervention sessions; to those found by Rech (2005), who studied premature babies participating in

individual and group interventions in 24 sessions, as well as to those found by Bombard (2008), who, also in 24 weeks, studied children between 6 and 18 months old, who had delays in motor development, and lived in a situation of socioeconomic vulnerability.

The experience provided by the intervention helped improve behaviors present in the motor repertoire of the infant, and allowed a substantial increase of motor stimuli, as babies, who previously received limited attention and scarce teaching materials, began to experience an enriching environment and their experiences came to be mediated by an educator (RUMOR, 2003, BRONFENBRENNER, 2002; KREBS, 1995; WOLF, GALLOWAY, SAVELSBERGH, 2004). The intervention allowed the children a series of new interactions with the educator, in an enriched environment with appropriate toys for their age and assignments. The tasks fulfilled the wishes of babies within the limits of what the intervention proposed. The flexibility of the intervention allowed reciprocity in the interaction of the intervener with the baby, even though most of the time the tasks proposed in the intervention protocol were kept.

The complexity of the intervention task increased gradually, adapting to the developmental needs of babies. The change in the control of the situation seems to be beneficial to the developing baby (BRONFENBRENNER, 2002; KREBS, 2003), who starts to experience the environment with greater autonomy. The reciprocity achieved in a joint activity dyad (inter-relationship between two people doing something together) allowed for an increased motivation and an engagement of the intervention and possibly influences the child's behavior, even when one of the participants, in this case the educator, is not present (BRONFENBRENNER, 2002; KREBS, 2003; WOLF, GALLOWAY, SAVELSBERGH, 2004).

Still regarding social interaction, it was observed that only one baby, Maria, maintained her greatest interest in the

educator, rather than in the object. This interest usually begins to reduce when the baby is between 4 and 6 months old, and the attention is progressively directed to the object (ROCHAT, 2001). This delay leads to other difficulties, since the grasp depends on sequential actions such as viewing the object, visual pursuit, head movement toward the object and action of the upper limb (WOLF, GALLOWAY, SAVELSBERGH, 2004). These difficulties presented initially by Maria were gradually overcome during the intervention.

The sensorimotor stimulation, as proposed in the intervention, provided direct exploration of the characteristics of the objects, allowing the experience of a new interaction situation. The exchanges between infant and educator through recreational activities allowed the observation of an improved ability to manipulate objects and an improvement of the interaction hand/toy in three babies (WOLF, GALLOWAY, SAVELSBERGH, 2004). During the intervention, the objects were presented in different ways during the manipulation phase, because the way the toy is presented can affect the accuracy of the grasp (ROCHAT, 2001). The different forms of presentation of the object, implemented in the sessions, led to the need of finding new motor strategies, enabling greater exploration of the possibilities of movement and, consequently, a larger motor repertoire. The increase in the motor repertoire enabled the babies to construct different perceptions of their body in space, which is also an important factor in the act of reaching (SPENCER, VEREIJKEN, DIETRICH, THELEN, 2000). The use of different motor strategies, the exploration of movement possibilities and the observation of the consequences of these actions on the environment led the babies to select the most successful behaviors, thus improving their motor repertoire (WOLF, GALLOWAY, SAVELSBERGH, 2004).

Postural control is an important achievement to increase manipulative experiences, since raising the arm away from the body to reach an object causes imbalances, which will be offset by postural adjustments (SAVELSBERGH, HOFSTEN,

JONSSON, 1997). However, to experience these adjustments, babies need to be manipulated and unbalanced in their positions through the intervention of the educator, something that was not seen in the daycare routine, but which was implemented in the intervention sessions. Without these adjustments, the baby presents more difficulty in manipulating an object and motion inaccuracy. Babies who do not sit independently and have their hips stabilized still do not coordinate trunk flexion with the act of reaching (SAVELSBERGH, HOFSTEN, JONSSON, 1997). Babies who sat independently had more opportunities of unimanual reaching than babies who needed support to sit, which shows a strong association between sitting postural control and coordination of upper limb in the act of reaching (ROCHAT, 2001). In order to have a greater number of attempts at object manipulation it is necessary that the baby be stable in the sitting position and be able to correct the imbalances caused by the manipulation of toys. The intervention provided the minimum possible aid in the maintenance of the postures, demanding from the baby postural adjustments in order to avoid falling. The changes in locomotion skills are associated with increased understanding of depth and the notion of self positioning in the space (ROCHAT, 2001). This fact seems to also explain, indirectly, some influence in the mastering of postural control, as reaching requires calculation of depth to ensure greater precision of movement.

4.2 MACROSYSTEM INFLUENCES PRACTICE OF EDUCATORS

Considering that the macrosystem determines the policies that interfere in all other levels of the bioecological model, the contexts of daycare centers and early childhood education institutions should be analyzed in terms of their interactions and the macrosystem policies.

In 1996, with the Law of Guidelines and Bases of National Education (LDBEN)² No. 9394 of 12/20/1996, art.

²Lei de Diretrizes e Bases da Educação Nacional (LDBEN)

29, early childhood education became more prominent, as it was considered as part of the basic education. In other words, this stage began to have educational character, and work developed in day care centers shall no more have an assistencialist character, and has the responsibility of assisting in the development of children between 0 and 6 year sold. Reinforcing the importance of education in this initial phase of life, the general provisions of the LDBEN , article 22,as in the resolution of the CEB No. 1 of 07.04.1999, article 3, establishes the goals of basic education. One of them is the development of the student, further reinforcing the need to provide experiences that develop the child's potential.

The importance of the educational character of early childhood education is also shown in the number of children attending day care centers. According to the PNE, in 1998, 2.7 million enrollments were made in daycare centers, accounting for 66.3% of all enrollments made. To ensure that these children experience educational proposals from the beginning of life, the organization of pedagogical proposals for early childhood education was established by the National Curriculum Guidelines for Early Childhood Education³ (CEB No. 1, April 7, 1999) and has a mandatory character. Similarly, the National Curriculum Reference for Early Childhood Education (RCNEI) proposes a common basis for national education, presenting a set of references and pedagogical guidelines of voluntary implementation. The maintenance of this structure can be seen in the diagnosis of the National Education Plan⁴ (Law No. 10172), which shows, for early childhood education, the ratio of 21 students (from 4 to 6 years old) per teacher at municipal level and 23.4 students at state level, showing that "most environments do not count on qualified people, do not develop an adequate educational program, has no furniture, toys and other adequate educational

³ Diretrizes Curriculares Nacionais de Ensino Infantil

⁴ Plano Nacional de Educação

materials"⁵. Similar picture was found in the day care centers which the babies submitted to the intervention attended. There we saw a high number of babies per educator, lack of teaching materials, restricted physical space and physical restraint of babies to cribs and chairs. The vast majority of educators did not have specific qualification for educational activities. The educators who have a lack or limitation of specific qualification restrict their activities to the reproduction of parenting practices and a routine of culturally constructed care. Culture influences the form of interaction with babies, as well as the values and beliefs of educators about what is important for the development of babies and their own role in child care (EDWARDS et al., 2005, HARKNESS et al., 2007; HUIJBREGTS, LESEMAN, TAVECCHIO, 2008). Culture seems to often play a bigger role in the practices adopted by educators than the formal educational knowledge. Although mothers and educators believe that the environment of daycare plays an important role in the education of infants, they often underestimate the importance of educators in this process (MELCHIORI, ALVES, SOUZA, BUGLIANI, 2007). Therefore, although the laws ensure the need for early childhood education in daycare centers, the routine and the structure of operation of day care centers – including the day care centers where we conducted the intervention – often do not favor the educational approach, and still maintain an assistencialist structure.

Taking the importance of early childhood education into consideration, the LDBEN, in article 25, set as the authorities's goal the achievement of an adequate relationship between the number of students and teacher, workload and the material conditions of the establishment. This measure provides more opportunities for teachers to engage their students in this stage, once that time would not be restricted to meeting the basic needs of all students. Similarly, the LDBEN,

⁵"a maioria dos ambientes não conta com profissionais qualificados, não desenvolve programa educacional, não dispõe de mobiliário, brinquedos e outros materiais pedagógicos adequados"

in article 62, establishes the need for qualification of teachers who work with these age groups. Thus, it is established that the minimum training for early childhood education teaching be that offered at a high school level, the Normal school. The National Education Plan, approved by Law No. 10.172, of 01/09/2001, diagnosed that, of the early childhood education teachers, around 13% have only elementary education, complete or incomplete, 66% are high school graduates and only 20 % have a college degree. It was established as a goal that, within five years as of the date of approval, all the leaders of early childhood education institutions had the minimum training, Normal school, and that within 10 years had an undergraduate major. As of the time the plan was in force, early childhood education teachers had to have the minimum training, that is, the normal school, to be admitted. These targets were set because specific training was necessary to meet the educational needs of children from zero to six years old.

However, the results of this study suggest that these goals have not yet been met. But it should be emphasized that the problems with the effectiveness of the legislation, while a macrosystem that influences the motor experiences of children, is not the only aspect that directly affects early child education. The common culture of a group (educators of day care centers), which is expressed through cultural attitudes, ideologies, customs and social values, exert decisive influences on infant development (BRONFENBRENNER, 1995).

5 FINAL CONSIDERATIONS

Taking the macrosystem into consideration, it is important to note that despite the legislation and its provisions related to basic education, which seek an ideal situation for work and education, we see, through this study, the reality dissonance in the day care centers microsystem. Through the

analysis of three cases, the present study shows that the inclusion of educational practices such as motor intervention in day care centers benefits children's development.

Regarding intervention, it is important to realize that the daycare environment can be stimulating in a fairly simple way. The educational character of the intervention can be easily reproduced by the educators. The main difficulties for this to happen lie in the following reasons: the unawareness of how to effectively use the time the babies spend in the daycare to educate them; the large number of babies per teacher; the importance of the work done by the educators is not recognized. The educators do not stimulate or interact adequately with the babies not by lack of interest, but because they are unaware of the educational potential of their work and because they need to meet the basic needs of all children. These problems can be corrected through proper training of these educators. Improving the training and participation in training courses and continuing education could reduce these difficulties. Teachers training and reduction of pupil-teacher ratio per class should be implemented, since these situations are already required by law, compliance with the law seems to be of the essence for improving the quality of early childhood education.

Finally, we want to emphasize that the actions on health and education should be structured based on the implementation of actions to promote the quality of life of children. It should be noted that any attempt to improve the quality of child development in terms of motor development has as primary contexts the family and the day care center. Therefore, it behooves the educator to interact more with the family, thereby providing a greater commitment on the part of all with regard to the health and education of the child.

Educação infantil e intervenção motora: um olhar a partir da teoria bioecológica de Bronfenbrenner

Resumo: Este estudo investigou a relação entre o enriquecimento do contexto da creche e a legislação vigente.

Três estudos de caso com bebês foram conduzidos no paradigma da Teoria Bioecológica. Os resultados demonstraram que os bebês apresentaram novas competências de manipulação, controle postural e interação social. Entretanto a qualidade dos cuidados oferecidos na creche era restrita à higiene e alimentação. A intervenção pode ser implementada no espaço da creche; entretanto faz-se necessário se fazer cumprir a legislação no que diz respeito à formação e capacitação de educadores e à razão criança-educadores para efetivamente transformar o caráter assistencialista da educação infantil.

Palavras-chave: Creches. Legislação como assunto. Intervenção precoce (Educação). Educação infantil.

Educación infantil e intervención motriz: una mirada a partir de la teoría bioecológica deBronfenbrenner

Resumen: El estudio ha investigado la relación entreenriquecimiento delcontexto de la guardería infantil y lalegislación vigente. Tres estudios de caso con bebésfueron conducidos en el paradigma de la Teoría Bioecológica.Los resultados han demostrado que los bebéspresentaron nuevas competencias de manipulación,control postural e interacción social. Sin embargo, localidad de los cuidados que brinda la guardería erarestricta a la higiene y a la alimentación. La intervención puedeser implementada en el espacio de la guardería; pero esnecesario hacer cumplir la legislación con respecto a laformación y capacitación de educadores y razón niños/educadorespara efectivamente transformar el carácterasistencialista de la educación infantil.

Palabras clave: Jardines Infantiles. Legislación como una materia. Intervención Precoz (Educación). Educación preescolar.

REFERENCES

- ALMEIDA, Carla Skilhan. **Intervenção motora:** efeitos no comportamento do bebê no terceiro trimestre de vida em creches de Porto Alegre. 2004. 196 f. Master's Thesis (Human Movement Science) – Escola de Educação Física, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2004.
- ALMEIDA, Carla S.; VALENTINI, Nadia C.; LEMOS, Caroline X. G. A influência de um programa de intervenção motora no desenvolvimento de bebês em creches de baixa renda. **Revista Tema Sobre Desenvolvimento**, São Paulo, v. 14, n. 83, p.40-48, 2005.
- ARNS, Ulrika. **Que fazemos com as nossas crianças?** um estudo do atendimento das crianças de 0-3 anos nas creches públicas de Cruz Alta. 1998. 142 f. Master's Thesis (Education) – Faculdade em Educação nas Ciências, Universidade Regional do Nordeste, Campina Grande, 1998.

BEE, Helen. **A criança em desenvolvimento**. 7. ed. Porto Alegre: Artes Médicas, 1996.

BERLEZE, A. **Desenvolvimento motor de crianças obesas: uma análise de contexto**. 2002. 120 f. Master's Thesis (Human Movement Science) – Escola de Educação Física, Universidade Federal de Santa Maria, Santa Maria, 2002.

BÉZIER, Marie-Madeline; HUNSINGER, Y. **O bebê e a coordenação motora**. São Paulo: Summus, 1994.

BHERING, Eliana; NEZ, Tatiana B. D. Envolvimento dos pais em creche: possibilidades e dificuldades de parceria. **Psicologia teoria e pesquisa**, Brasília, v. 18, n. 1, p.6373, 2002.

BOATO, Elvio Marcos. **Henri Wallon e a deficiência múltipla: uma proposta de intervenção pedagógica**. Brasília: Hildebrando, 2003.

BOMBARDA, Alessandra. **Efeitos da intervenção motora em diferentes contextos no desenvolvimento motor da criança com atraso motor**. 2008. 124 f. Master's Thesis (Human Movement Science) – Escola de Educação Física, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2008.

BRASIL. Constituição, 1988. **Constituição da República Federativa do Brasil**. Brasília: Senado Federal, 1988.

BRASIL. Lei nº 10.172, de 9 de janeiro de 2001. Aprova o Plano Nacional de Educação e dá outras providências. **Diário Oficial da União**, Brasília, DF, 10 jan. 2001. Available at: <http://www.planalto.gov.br/ccivil_03/Leis/LEIS_2001/L10172.htm> Accessed on: May 21, 2008.

BRASIL.Ministério da Educação e do Desporto. Diretrizes Curriculares Nacionais para a formação de Docentes de Educação Infantil e dos anos Iniciais do Ensino Fundamental.Resolution CEB nº 2, of April 19, 1999. **Diário Oficial da União**, Brasília,1999. Available at: http://portal.mec.gov.br/cne/arquivos/pdf/rceb02_99.pdf Accessed on: May 21, 2008.

_____. Lei de Diretrizes e Bases nº 9.394, of December 20, 1996. **Diário Oficial da União**, Brasília, 1996. Available at: <http://www.planalto.gov.br/ccivil_03/Leis/L9394.htm>Accessed on: May 20, 2008.

_____.CNE/CEB. Resolution CEB nº 1, of April 7, 1999. Institui as Diretrizes Curriculares Nacionais para a Educação Infantil. **Diário Oficial da União**, Brasília, 13 abril 1999.Seção 1, p.18. Available at: <<http://portal.mec.gov.br/cne/arquivos/pdf/CEB0199.pdf>>Accessed on: May 20, 2008.

BRASIL. Ministério da Educação e do Desporto. Secretaria de Educação Fundamental. **Referenciais Curriculares Nacionais para a Educação Infantil**. Brasília, 1998. Available at:

<<http://portal.mec.gov.br/seb/index.php?option=content&task=view&id=556>>A
 ccessed on: May 20, 2008.

_____. Departamento de Políticas Educacionais. **Política Nacional de Educação Infantil**: pelo direito das crianças de zero a seis anos à educação. Brasília, 2006. Available at:
 <<http://portal.mec.gov.br/seb/arquivos/pdf/Educinf/eduinfpolit2006.pdf>>Accessed on: May 20, 2008.

BRONFENBRENNER, Urie. The Bioecological Model from a Life Course Perspective: reflections of a participant observer. In: MOEN, Phyllis; ELDER, Glen H.; LÚSCHER, Kurt (Eds.). **Examining lives in context**: perspectives on the ecology of human development. Washington, DC: American Psychological Association, 1995. p.599-649.

_____. **A ecologia do desenvolvimento humano**: experimentos naturais e planejados. 2. ed. Porto Alegre: Artes Médicas, 2002.

_____. Ecological system theory. In: ROSS, Vasta. **Six theories of child development**: revised formulations and current issues. London: Jessica Kingsley, 1992. p.187-249.

_____. **Making human being human**: bioecological perspectives on human development. Thousand Oaks: SAGE, 2005.

BRONFENBRENNER, Urie; CROUTER, Anne. Evolution of Environmental Models in Developmental Research. In: KESSEN, W.; MUSSEN, Paul H. (Eds.). **Handbook of Child Psychology**. New York: Wiley, 1983.

BRONFENBRENNER, Urie; MORRIS, Pamela A. The Ecology of developmental process. In: DAMON, I.; LERNER, R. M. (Org.). **Handbook of child psychology**: theoretical models of human development. New York: John Wiley, 1998. v. 1.

COPETTI, Fernando. Atributos pessoais de crianças que se engajam na prática esportiva: um olhar orientado pelo modelo bioecológico. In: KREBS, Ruy Jornada (Org.). **Os processos desenvolvimentais na infância**. 1. ed. Belém: GTR, 2003.

EDWARDS, Carolyn; KNOCH, Lisa; AUKRUST, Vibeke; KUMRU, Asiye; KIM, Misuk. Parental ethnotheories of child development: Looking Beyond Independence and Individualism in American Beliefs System. In: KIM, Uichol; YANG, Kuo-Shu; HWANG, Kwang-kuo (Ed.). **Indigenous and cultural psychology understanding people in context**. New York: Springer, 2006.

GALLAHUE, David; OZMUN, John C. **Compreendendo o desenvolvimento motor**: bebês, crianças, adolescentes e adultos. São Paulo: Phorte, 2001.

HARKNESS, Sara; SUPER, Charles; SUTHERLAND, Mary; BLOM, Marjolijn; MOSCARDINO, Ughetta; MAVRIDIS, Caroline; AXIA, Giovanna. Culture and the construction of habits in daily life: Implications for the successful development of children with disabilities. **OTJR: Occupation, participation and health**, Bathesda, v. 27, p.33-40, 2007.

HAYWOOD, Katheleen M.; GETCHELL, Nancy. **Desenvolvimento motor ao longo da vida**. 3. ed. Porto Alegre: Artmed, 2004.

HUIJBREGTS, S; LESEMAN, P.P.M.; TAVECCHIO, L.W.C. Childrearing beliefs of professional caregivers from different cultural communities in the Netherlands. **Early Childhood Research Quarterly**, Amsterdam, v. 23, p.233-244, 2008.

KREBS, Ruy Jornada. Os processos desenvolvimentais na infância. In: **Sociedade Internacional para estudos da criança**. Belém: GTR, 2003.

_____. **Urie Brofenbrenner e a ecologia do desenvolvimento humano**. Santa Maria, RS: Casa Editorial; 1995.

KREBS, Ruy Jornada; ZUCHETTO, Ângela. Os contextos da educação inclusiva numa perspectiva da teoria ecológica de Bronfenbrenner. In: FREITAS, Soraia Napoleão (Org.). **Tendências Contemporâneas de Inclusão**. 1. ed. Santa Maria: Editora da UFSM, 2008.

LOBO, Michele A.; GALLOWAY, James C.; SALVELSBERGH, Geert J. P. General and task-related experiences affect early object interaction. **Child Development**, Oxford, v. 75, n. 4, p.1268-1281, 2004.

LÜSCHER, Kurt. Homo Interpretans: On the Relevance of Perspectives, Knowledge, and Beliefs in the Ecology of Human Development. In: MOEN, Phyllis; ELDER, Glen H.; LÜSCHER, Kurt (Eds.). **Examining Lives in Context: perspectives on the ecology of human development**. Washington, DC: American Psychological Association, 1995.

MELCHIORI, Ligia E.; ALVES, Zélia M. M.; SOUZA, Dayana C.; BUGLIANI, Maria A. Família e creche: crenças a respeito e temperamento e desempenho de bebês. **Psicologia: teoria e pesquisa**, Brasília, v. 23 n. 3, p.245-252, 2007.

NEWELL, Karl. Constraints on the development of the coordination. In: WADE M.; WHITING, H.T.A. (Eds.). **Motor development in children: aspects of control and coordination**. Dordrecht: MartinusNijhof, 1986.

PAPALIA, Diane E.; OLDS, Sally Wendkos. **Desenvolvimento Humano**. 7. ed. Porto Alegre: Artes Médicas Sul, 2000.

PINTO, Elizabeth Batista; VILANOVA, Luiz Celso Pereira; VIEIRA, Raymundo Manno. **O desenvolvimento do comportamento da criança no primeiro ano de vida: padronização de uma escala para avaliação e comportamento**. São Paulo: Casa do Psicólogo, 1997.

PIPER, Martha C.; DARRAH, Johanna. **Motor assessment of the developing infant**. Amsterdam: Elsevier, 1994. RAMEY, Craig T.; BRYANT, Donna M.; SUAREZ, Tanya M. Early intervention: why, for whom, and at what cost? *Clinics in Perinatology*, Philadelphia, v. 17, n. 1, p.47-55, 1990.

RAMEY, Craig T.; RAMEY, Sharon, L. Prevention of intellectual disabilities: early interventions to improve cognitive development. **Preventive Medicine**, Nova York, v. 27, n. 2, p.224-232, 1998.

RECH, Daniele M. R. **Influências de um programa de intervenção motora com três diferentes abordagens interventivas no desempenho motor de crianças nascidas pré-termo**. 2005, 164 f. Master's Thesis (Human Movement Science) – Escola de Educação Física, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2005.

ROCHAT, Phillipe. Dialogical nature of cognition. **Monographs of the Society for Research in Child Development**, Oxford, v. 66, n. 2, p.133-143, 2001.

ROSE, J. Debra. **A multilevel approach to the study of motor control and learning**. Needham Heights: Alyn & Bacon, 1997.

SANTOS, Lana Ermelinda da Silva. **Creche e pré-escola: uma abordagem de saúde**. São Paulo: Artes Médicas, 2004.

SAVELSBERGH, Geert; HOFSTEN, Claes V.; JONSSON, Bert. The Coupling of Head, Reach and Grasp Movement in Nine Months Old Infant Prehension. **Scandinavian Journal of Psychology**, Oxford, n. 38, p.325-333, 1997.

SPENCER, John P.; VEREIJKEN, Beatrix; DIEDRICH Frederick J.; THELEN, Esther. Posture and the emergence of manual skills. **Developmental Science**, Oxford, v. 3, n. 2, p.216-233, 2000.

VIEIRA, José Luiz Lopes. Talento infantil: abordagens sistêmicas do processo de abandono de talentos. In: KREBS, Ruy Jornada (Org.). **Os processos desenvolvimentais na infância**. Belém: GTR, 2003.

WASIK, Barbara H.; RAMEY, Craig T.; BRYANT, Donna M.; SPARLING, J. A longitudinal study of two early interventions strategies: project CARE. **Child Development**, Oxford, v. 61, n. 6, p.1682-1696, 1990.

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