

Play for the development of body schema and spatial and temporal orientation: analysis of an intervention¹

Sara Domiciano Franco de Campos^a, Mirela de Oliveira Figueiredo^b,
Sheila Maria Mazer-Gonçalves^c, Elisandra dos Santos^d, Letícia Carrillo Maronesi^a

^aUniversidade Federal de São Carlos – UFSCar, São Carlos, SP, Brazil.

^bDepartamento de Terapia Ocupacional, Universidade Federal de São Carlos – UFSCar, São Carlos, SP, Brazil.

^cUniversidade de São Paulo – USP, Ribeirão Preto, SP, Brazil.

^dCentro Universitário de Araraquara – UNIARA, Araraquara, SP, Brazil.

Abstract: Introduction: Childhood is a significant stage in human development in which many skills are developed influencing learning progress. Play is an activity of children's daily lives that enhances cognitive, social, emotional, and psychomotor abilities. Objective: Evaluate the results of an intervention for a child with delayed development of body schema and spatial and temporal orientation. Method: This study adopted the semi-experimental design type of pre and post-test. The Motor Development Scale (MDS) was applied in a four-year-old child. From the MDS results, an intervention plan was prepared concerning games that stimulate the previously mentioned acquisitions. The implementation of the plan lasted two months and the child was evaluated before and at the end of the intervention. The JT method was adopted for data analysis and verification of significant and reliable clinical changes. Results: The child achieved significant change in the three items assessed. In terms of clinical significance, the child changed status on spatial organization, becoming part of the functional population. Body schema remained in the dysfunctional population and the child's temporal orientation was in the range of uncertainty. Conclusion: The results showed positive and reliable changes in the evaluated items, confirming the positive effect of play as an occupational therapeutic resource present in the developmental intervention program. It emphasizes the importance of conducting further studies with a larger number of participants for new data and findings on the use of play in interventions into psychomotor development.

Keywords: *Occupational Therapy, Child Development, Play.*

O brincar para o desenvolvimento do esquema corporal, orientação espacial e temporal: análise de uma intervenção

Resumo: Introdução: A infância é uma fase significativa do desenvolvimento humano, na qual se desenvolvem várias aptidões, ocorrendo evoluções na aprendizagem. O ato de brincar é uma atividade do cotidiano das crianças e aperfeiçoa as habilidades cognitivas, sociais, emocionais e psicomotoras. Objetivo: Avaliar os resultados de uma intervenção para uma criança com atraso no desenvolvimento do esquema corporal, da orientação espacial e da orientação temporal. Método: Este estudo adotou o design quase-experimental do tipo pré e pós-teste. Foi aplicada a Escala de Desenvolvimento Motor (EDM) em uma criança de quatro anos. A partir dos resultados da EDM, foi elaborado um plano de intervenção com brincadeiras que estimulasse as aquisições acima citadas. A concretização do plano de intervenção teve duração de dois meses, sendo a criança avaliada antes e no término da intervenção.

O Método Jacobson e Truax foi adotado para análise dos dados e verificação da ocorrência de mudanças confiáveis e clinicamente significativas. Resultados: A criança obteve mudança confiável nos três itens avaliados. Em relação à significância clínica, na organização espacial a criança mudou seu status clínico, passando para a população funcional. No esquema corporal, a criança permaneceu na população disfuncional, e na organização temporal apresentou-se na faixa de incerteza. Conclusão: Os resultados demonstraram mudanças positivas e confiáveis nos itens avaliados, confirmando um efeito positivo do brincar enquanto recurso terapêutico ocupacional presente no programa de intervenção elaborado. Ressalta-se a importância da realização de novos estudos com maior número de participantes para novos dados e descobertas sobre a utilização do brincar em intervenções no desenvolvimento de aquisições psicomotoras.

Palavras-chave: *Terapia Ocupacional, Desenvolvimento Infantil, Brincadeiras.*

1 Introduction

Psychomotor development is a process of change in the level of functioning of the human being considered a sequential and continuous process, related to chronological age, in which individuals acquire a huge amount of skills that progress from simple and disorganized movements to highly organized and complex (CAETANO; SILVEIRA; GOBBI, 2005; WILLRICH; AZEVEDO; FERNANDES, 2009).

In this way, the motor development involves the functional development of the whole body and its parts, being the fundamental basis for the learning process of the child (HAYWOOD; GETCHELL, 2004; NICOLA, 2004; OLIVEIRA; SOUZA, 2013). With this, there is a close relationship between what the child is able to learn cognitively and which is motor learning and performance (ROSA NETO et al., 2010).

It is important to note that there are fundamental standards that rule the development, the phase from birth until about the age of six years old corresponds to the period of acquisition, and after six years old it is a stage of refinement and combination of acquired patterns (GALLAHUE; OZMUN; GOODWAY, 2013). During the first six years of life, for the acquisition of the fundamental patterns, psychomotor components are required as the body schema, spatial and temporal organization (GALLAHUE, 2000; OLIVEIRA, 2002; PINTO, 2009; ROSA NETO et al., 2011).

Body schema is the recognition that a person has of their own body through body awareness, of the functions of each part of the body and the possibilities of action with the body and its parts. It is therefore a result of information collection and processing obtained by the sensory channels, and

its building comes from the organization of the sensations related to the body itself in association with data from the outside world (ROSA NETO, 2002; ROSA NETO et al., 2011).

Spatial organization represents the orientation of the individual in space that has themselves as a first reference and later refers to objects and/or static and moving people. All sensory modalities are involved in spatial perception that ensures the human being essential behaviors related to mobility, orientation and operation evolution (ROSA NETO, 2002; FONSECA; BELTRAME; TKAC, 2008).

Temporal orientation includes the ability of the individual to situate in function of the occurrence (before, during, after) and succession of events, the duration of the intervals (notion of long/short time, regular/irregular rhythm, cadence fast/slow) cyclic renewal of periods (day, week, month, year) and the irreversible character of the time (it is impossible to go back in time). It is directly linked to spatial orientation, both inseparable, since the body coordinates and moves continuously within a given space and time (DE MEUR; STAES, 1991; VASCONCELLOS, 2002; FIGUEIREDO; EMMEL; ROSÁRIO, 2013).

Several factors may influence and determine child development such as the personal characteristics and the physical and socio-cultural environment in which the child is inserted (FERNANDES; DANTAS; MOURÃO-CARVALHAL, 2014).

Thus, the events of everyday life that relate to the environment in which the child is inserted provide maturation experiences during development. These experiences help in building their personality and their way of dealing with the world. Since playing is an activity that occupies a considerable part of

the daily life of the child, this becomes critical to their development (NUNES et al., 2013).

In this way, playing and the games contribute to the stimulation of growth and physical, relational and general development of the child and can provide information to occupational performance (CASE-SMITH, 2005; CRUZ; EMMEL, 2007; NUNES et al., 2013), promoting the transition from one stage of development to another (OLIVEIRA; FRANCISCHINI, 2009). They also influence on socialization of the child, providing them with new findings and learnings in the context in which they are inserted.

With that, playing is a social and cultural activity that assumes apprenticeship. For this learning occurs, the child needs to try something to which they have the ability and think about it. The advantage of learning achieved by means of playing lies in the fact that the mistakes are not considered errors, but attempts to hit. When the child is not afraid of making mistakes, they risk more and the atmosphere of joy and relaxation is maintained, thus preserving the pleasure in the activity that consequently will contribute to learning (SCALHA et al., 2010).

From the understanding of playing as an fundamental occupation for the child, the occupational therapy uses playing and games as therapeutic resources in order to promote the proper development of the necessary skills for each age group and the occupational performance of the child. For this, the occupational therapists evaluate the games and activities which constitute them, so that these are appropriate for each child, according to their culture, level of development and needs (SIMON, 2001; CRUZ, 2002; GIARDINETTO et al., 2009). In addition to that, through the use of games, together with occupational therapist, it is possible to provide actions whose importance arises not only in the increase of performance components, but understanding playing as the main occupational role in childhood, which should be encouraged and developed through therapeutic strategies (GRIGOLATTO et al., 2008).

Finally, whereas the occupational therapist is a skilled professional able to analyze and evaluate playing, plan interventions and stimulate cognitive, social and motor skills of the child (KNOX, 2002; SOUZA; MARINO, 2013), the present study aimed to develop an intervention based on playing, for a

child with body schema, spatial orientation and temporal orientation delayed development, and evaluate the effectiveness of its results.

2 Method

This research used the methodological design of quasi-experimental study of pre-and post-test type. In this type of design the researcher performs intervention in the demands that are being investigated. The research subjects who receive the intervention are formed considering the operational criteria of the study, to sample composition and recruitment of volunteers (KENNY, 1975; SHANDISH, 2001).

2.1 Participant characterization

The participant, female, was four years old and history of meningitis, traumatic brain injury and hydrocephalus because when baby suffered maltreatment of family members. Currently she does not make use of valve, she is under the supervision of another family and presents significant delay in psychomotor development. She has attended a child rehabilitation association for four years, with weekly attendance of speech therapy and occupational therapy. It should be noted that one of the researchers of the study was the occupational therapist of the participant.

Participant selection followed inclusion criteria previously stipulated: chronological age between three and five years and the presence development delay of body schema, spatial orientation and temporal orientation with low level classification according to the chronological age, following the scale of Motor Development (SMD) (ROSA NETO, 2002).

The criteria for exclusion of the participant related to the presence of physical disability, visual and/or hearing.

2.2 Data collection instrument

SMD of Rosa Neto (2002) comprises a set of diversified and evidence of difficulty degree, leading to a thorough exploration of different development sectors, such as global motor skills, fine motor skills, balance, body schema, spatial organization, temporal organization and laterality. Its application in a subject allows to assess their level of psychomotor development, considering

successes and failures, taking into account the standards set by the instrument.

2.3 Procedures for data collection

This research began with the approval of the Ethics Committee and during its entire application compliance with applicable requirements was guaranteed.

The child rehabilitation institution in the State of São Paulo in which the researcher works, was selected for sample collection and authorized the completion of the study. After selected the participant, the purpose and the form of application of the study were explained to the child's guardian, who signed an informed consent authorizing the participation of the child.

The study was developed in the institution in periods during the appointments, in order to avoid duplication of assistance and due to the unavailability of the child to go in a different time. Both the family and the institution agreed to perform the occupational therapy service in the same period.

The first stage of data collection, named pre-test, came through with the implementation of the SMD. Right after the reviews, the intervention phase, based on the development and implementation of a program geared to meet the needs identified in the results of the SMD was performed. After 2 months' intervention, the performance of the participant was reevaluated by SMD to analyze the occurrence of reliable statistically significant changes.

2.4 Intervention plan

The intervention plan, drawn from the results of the SMD, was composed of games to stimulate the acquisition that presented deficit such as being the body schema, spatial and temporal orientation.

Eight intervention sessions were held, one each week, with 30 minutes each session. The games carried out are below cited and listed in Table 1, according to their objectives, procedures and performance of the child: Psychomotor Circuit, playing with the body, drawing the human body, objects collage, follow the master, little house game, reflection in the mirror, story telling, painting in the mirror.

Table 1. Participant performance description during playing sessions.

Session	Games	Objectives and Procedures	Performance
First	Psychomotor circuit	Stimulate the spatial and temporal organization, it consisted of obstacles formed with Hula Hoop, rope and cones, in which the participant should follow a sequence and perform a different movement at each obstacle, like jumping with both feet a height of 5 cm, walk without stepping on the Hula Hoop, trespass the cones, jump with one foot on the floor marking.	Child had great difficulty in the circuit, even with verbal commands and visual cues. She couldn't focus on activity and distracted easily. The activity was completed, however so unsatisfying. Already playing with the body, the child distracted during the activity, being necessary to call her attention all the time. When focused on activity, she could perform it successfully identifying body parts.
	Playing with the body	Stimulate the body schema, the game ran according to verbal commands. Every time the ball was played, the participant should pay attention to the command before performing the movement, for example: catch the ball with both hands, catch the ball with one hand, kick the ball with the left foot, grab the ball and put it in the head.	
Second	Drawing the Human body	Stimulate body schema. The activity was to draw a human body in which the participant should look and recognize what body parts were missing and put them in the right place.	The child distracted during the activity, required many verbal tips and assistance of the researcher to draw the parts of the body. She had a lot of trouble finding the body part that was missing in the picture and put it in the right place. She completed the activity, but so unsatisfying.

Table 1. Continued...

Session	Games	Objectives and Procedures	Performance
Third	Objects collages	Stimulate the temporal and space organization. It consisted of some figures in which the participant should recognize what objects were more suitable to decorate each figure and the appropriate places in which they should stay. Some verbal commands were given, for example: paste the sun on top of the house, paste the rabbit under the tree, what clothes do you wear before going to bed? among other commands.	The child distracted with the external stimuli, but managed to remain sitting for longer. She required verbal and visual cues aid to carry out the activity, and had much difficulty in differentiating and memorize upstairs, downstairs. She completed the activity, but so unsatisfying.
Fourth	Follow the Master	Stimulate the body schema, temporal and spatial organization. In this activity, the participant should see and imitate the actions of the therapist, for example: put one hand on the nose, raise your right leg, put both hands on the head, among other commands.	Visual cues and verbal commands were given all the time, but the child was distracted and agitated, not paying attention. When requested, she imitated any gestures and focused on something else. The activity was not completed.
Fifth	Little house game	Stimulate the temporal and spatial organization and body schema. In this game, the first step was to make a doll house and place the furniture in the appropriate locations, but it was necessary to wait for the commands of the therapist, for example: point where the room is, what furniture is in the room where you sleep, where meals are made, and so on. The second step was to play with the doll in the house, being required in some moments to recognize parts of the doll's body.	Attention and concentration of the child were better, she was able to pay attention to the commands and get involved in the game. With verbal commands and less aid, she managed to perform the activity more satisfactorily, listing positions as upstairs, downstairs, time, etc.
Sixth	Reflection in the mirror	Stimulate body schema. In this activity, the participant was facing the mirror, looking at and recognizing parts of her own body and in accordance with the therapist, she showed what was being asked.	The child remained more focused on the activity, having difficulty in laterality in a few moments, but with verbal commands and visual cues the activity was completed successfully and satisfactorily.
Seventh	Story telling	Stimulate the spatial and temporal organization. This activity consisted on re narrating a story and drawing something related to it.	The child was aware of the story and, with the help of verbal, retold and drew the story told so satisfying.
Eighth	Painting in the mirror.	Stimulate the body schema. In this activity, the drawing of a human body was reproduced in the mirror with paint and the participant should look at the drawing and complete the parts of the body. The mirror helped the participant to look at her own body as well.	Because of the ink, the child showed agitated but kept attention on verbal commands to performing the activity, and even having a hard time in some parts of the body, she managed to complete the activity.

The ten sessions were organized as follows: one for evaluation, eight for intervention and one for reevaluation.

At the end of the study, after all the results analyzed, a feedback was given to the child's guardians. All the

games held during the sessions were shown and reported the participant's performance. Then the graphs drawn up on the basis of the results and the changes obtained in relation to the interventions were explained.

2.5 Procedures for data analysis

The SMD determines scores for each motor test that composes it, according to the performance required to complete each task. By means of an arithmetic procedure, defined by the SMD to score the results of the individual tests, motor profile of each participant is produced. These individual results, reproduced graphically when compared with the normative population indicate the subjects that do not have a motor development suitable for their age (ROSA NETO, 2002).

In order to perform a comparative analysis between pre-and post-intervention scores, were adopted the conceptions and the criteria formulated by the Method Jacobson and Truax (JT) (JACOBSON; TRUAX, 1991).

This method was proposed to demonstrate the effectiveness of an intervention, gathering empirical evidence relevant to its internal and external validity. The Method JT (JACOBSON; TRUAX, 1991) implies two complementary processes, the calculation of Reliable Change index (RCI) and clinical significance (CS). The RCI serves to determine whether the pre-and post-intervention changes can be attributed to the intervention or to errors of measurement. It acts as an indicator of measurement error in the client assessment to be compared to a theoretical distribution of the instrument errors. For this, the authors have developed a specific formula based on the difference between pre and post test divided by the standard error of the difference. CS allows you to check if the changes occurred in an a clinically relevant extension (JACOBSON; TRUAX, 1991).

When applying this metric in the sample of participants in an intervention program, you can determine the percentage of individuals who have improved with the intervention but not recovered, the percentage of individuals who have recovered and the percentage of individuals who have remained unchanged or worsened during treatment. These descriptive percentages can be compared between groups by means of contingency tables analysis to determine if the observed differences between groups are statistically significant, or may simply be used descriptively to increase the standard of the comparisons between groups based on differences. Anyway, the proportions provide valuable information on the variability of the result within each treatment condition and so determines the practical importance of intervention

(JACOBSON et al., 1999; VILLA; AGUIAR; DEL PRETTE, 2012).

3 Results

Acquisitions on body schema, spatial organization and temporal organization were evaluated with the SMD and stimulated with the games in the intervention plan.

It can be observed that at the beginning of the sessions, the child had great difficulty in performing the games during the first sessions, losing focus and attention quickly, giving up easily, having a hard time understanding the data commands and not being concentrated in the activities. the help of the researcher was required to guide the patient during the games and finish them successfully. Just the game "Follow the master" could not be performed because the child did not focus on commands.

From the 5th session on, an improvement in attention and concentration of the child during the games was noticed, managing to perform them with more autonomy. From that session, the completion of the games stages began to be more satisfying. In Table 1 we can see the description of the games and the performance of the participant.

The evaluations of acquisitions pre and post test were analyzed by JT Method, which produced scatter charts that present reliable and clinically significant changes occurred.

In relation to the body schema, the result of the analysis between pre-test and post-test 1 indicates that the participant (S1) obtained reliable change, what means that this is related to the intervention and not due to a measurement error.

Regarding to clinical significance, that is, if there's a change in clinical status, it is observed that the participant was in pre-intervention in dysfunctional population and post-test 1 population remained in this population, i.e. changes did cause her to come out of a dysfunctional population (population clinical) for a population with a normative score (non-clinical population). Next, Figure 1 presents this information.

On spatial organization, the result of the analysis between pre-test and post-test 1 indicates that the participant (S1) obtained reliable change, namely, the change is related to the intervention and not due to a measurement error.

The clinical significance, that is, if there's a change in clinical status, points out that the participant

performed in pre-intervention in dysfunctional and during post-test 1 she remained in that population, that is, had significant changes, the point out from a dysfunctional population (clinical population) to a population with a normative score (non-clinical population). These information is presented in Figure 2.

In temporal organization, the result of the analysis between the pre-test and post-test 1 indicates that the participant (S1) also obtained reliable change, so this is also related to intervention and not due to a measurement error.

In relation to clinical significance, if there's a change of clinical status, the participant obtained changes, but as she is in the uncertainty range (surrounding the bisection), it is not possible to say anything about this, because it may be due to measurement errors. Figure 3 illustrates these results.

4 Discussion

The results obtained show that there were reliable positive changes in psychomotor items that passed by stimulation through games. In addition, in one of the items, the participant had such significant changes to come out from a dysfunctional population to a population with a normative score. The literature confirms this, pointing out that playing has been used as a resource for occupational therapists, resulting in positive effects on child development (SILVA; PONTES, 2013; SOUZA; MARINO, 2013). The study of Maronesi et al. (2015) assessed the impact of an intervention through ludic activities with a child with delayed psychomotor development, and the results showed reliable positive changes in psychomotor items. In the study of Souza and Marino (2013) who used playing as an intervention strategy, it became clear how much the performance of occupational therapy was beneficial and meaningful in the life of the child, in order to maximize the satisfactory occupational performance, contributing to an improvement in quality of life, independence and effective participation in the activity.

A diverse range of health professionals focus on psychomotor skills in their your professional practice and adopt different models to justify their interventions (NICHOLLS et al., 2016).

In this sense, the results presented here favor the recognition of occupational therapy as one of the professionals areas who make up

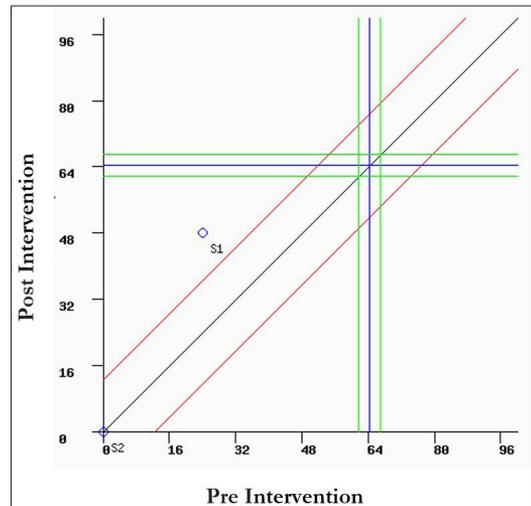


Figure 1. Body schema: pre test and post test 1.

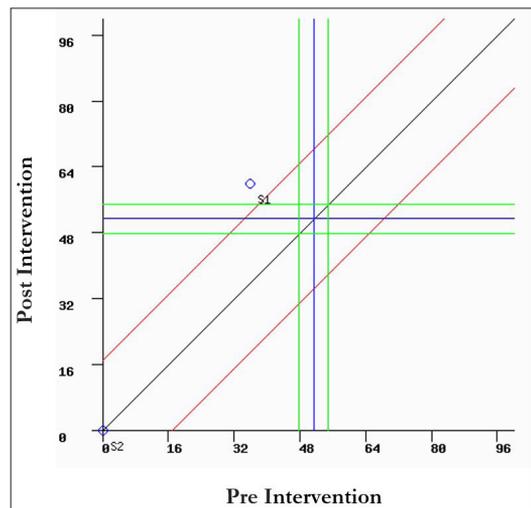


Figure 2. Spatial Organization: pre test and post test 1.

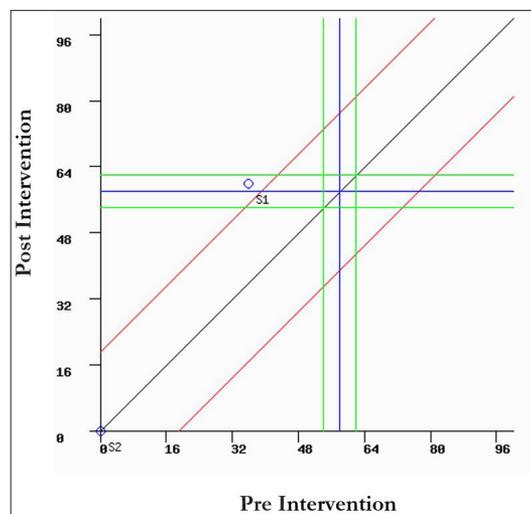


Figure 3. Temporal Organization: pre test and post test 1.

the multidisciplinary team focused on children with motor development delays intervention. In this way, the occupational therapist has specific functions, such as those carried out in this study, for example, the implementation of a standardized assessment instrument and the development of an intervention directed to the needs of these children (FIGUEIREDO; EMMEL; VILLA, 2015). Thus, we can suppose that an extension of the assistance could promote the change of the clinical status in the body schema and temporal organization items, since in the first sessions the child presented great difficulty in performing the games what gradually changed during the intervention implementation.

To the same extent, Beresford, Queiroz and Nogueira (2002) and Alves and Bianchin (2010), by using a program of intervention to stimulate the psychomotor activity, detected that concentration, attention, reasoning, and intelligence were increased at the same time. This fact can also be observed in the end of this study, which in the first sessions the patient presented low attention, concentration, and difficulties in the realization of the games, but gradually obtained a change in these items and a corresponding improvement in the performance of the different activities that made up therapeutic playing.

In the present study it was observed that, from the fifth game performed, the child kept attention and concentration on the activity for longer, watched in the commands given by the researcher, didn't need the repetition of many concepts, with verbal aid she could understand mistakes and rectify them, ending the activity successfully.

The delay in the body schema, spatial and temporal orientation presented initially by the participant of this research were also detected in other studies that evaluated the psychomotor development of children and that indicated that the assessment and detection are of fundamental importance to the development of interventions that meet the real needs of the customers (FIGUEIREDO; EMMEL; VILLA, 2015; ROSA NETO et al., 2011; MEDINA; ROSA; MARQUES, 2006; CAETANO; SILVEIRA; GOBBI, 2005; BERESFORD; QUEIROZ; NOGUEIRA, 2002).

According to the study of Rosa Neto et al. (2011), the body schema is commonly among the main areas that have a higher deficit in relation to what is expected for the age of the child.

The results of the study of Caetano, Silveira and Gobbi (2005) indicate that the capabilities that involve the body schema of children investigated developed around four to five years old and remained at the same level until six or seven years old. Thus, it is possible to that the intervention carried out in this study favored the reliable improvement and that the child is in the process of developing her body schema, as well as the spatial and temporal organization, requiring new interventions and stimuli, because the literature points out that the constitution of the body schema is fundamental to the development of the child, being a reference to the various possibilities of action, even implying, in the development of spatio-temporal organization (ROSA NETO, 2002; ROSA NETO et al., 2007; MEDINA-PAPST; MARQUES, 2010).

In the study of Pôrto and Ibiapina (2010), who examined the body schema development of a child with Down Syndrome through interventions in aquatic environment as occupational therapy setting, they noticed an improvement in the development of skills related to body scheme and, at the same time, a more active and autonomous participation in activities of daily living.

The research of Figueiredo, Emmel and Villa (2015) states that, through interventions, children who have achieved improvements in body scheme and spatial organization were the same who obtained positive changes in reading performance, since the notions of body, space and time are essential in the process of learning reading and written language.

On the other hand, in the work of Park, Jeong and Bornman (2011), which aimed to describe the effectiveness of psychomotor intervention in children with development delays, they found out that, first of all, there was efficiency in improving balance, postural control and hand-eye coordination and, secondarily, body schema and in spatial orientation were improved. Such studies reinforce the assumption that, when such psychomotor components are fully functioning, they impact on the integral development of the child, allowing them to act efficiently in learning tasks of various areas (VIEIRA, 2004; ROSA NETO et al., 2011). In addition to this, it can be noted that the psychomotor skills are primarily stimulated by professionals and consequently improve accordingly and are learned by the subject of the intervention. The contemporary literature about motor learning and cognition contains instructional frameworks that promote the justification of these practices,

and orientate to their more efficient and effective performance (NICHOLLS et al., 2016).

5 Conclusion

In this study, the impact of an intervention for a child with delayed psychomotor development is evaluated. The results showed positive and reliable changes in body schema, spatial and temporal organization, that is, these changes can be attributed to the intervention. In relation to the change of clinical status, only changes in spatial organization shifted the child from dysfunctional to functional population, but in body schema and temporal organization the child still presented in the post-test a score below the standards for her age group.

During childhood, many children may show changes in the course of their development due to poor stimulus means or as a result of any associated pathology, which can cause deficits in skills needed for learning. The acquisition of motor skills is fully related to the development of the body, space and time perception, being these three inseparable elements. In this way, the results confirm a positive effect of the proposed therapeutic intervention program, and the games, prepared and carried out with the participant of the study, favored the improvement of the items mentioned above.

With that, this study reinforces the importance of stimulating programs involving playing and games for the development of delayed psychomotor skills. Once playing is inherent to childhood behavior, promotes the development, improvement and/or refinement of different abilities, its importance as occupational therapy resource is justified.

It is also emphasized the relevant action of an occupational therapist as a professional that is part of a multidisciplinary team that works with children with psychomotor delays. This professional meets the needs of intervention of children with psychomotor delays qualified for evaluations and preparation of rehabilitation programs that help in the development and/or improvement of body schema, spatial and temporal organization.

The study, involving a single child, presents limitations, and the results should be considered under these perspectives. In addition, it has to be considered that the child remained having speech therapy and that the very process of natural development may have influenced the results identified.

With that, we suggest continuing the investigation into this issue, since the appropriate body schema, spatial and temporal organization development has important repercussions on the child's performance in different activities of daily life and, consequently, in their quality of life. In this way, it is necessary to conduct further studies with larger numbers of participants on the subject in question to produce new data and findings on the use of playing in intervention programs to develop psychomotor acquisitions.

References

- ALVES, L.; BIANCHIN, M. A. O jogo como recurso de aprendizagem. *Revista Psicopedagogia*, São Paulo, v. 27, n. 83, p. 282-287, 2010.
- BERESFORD, H.; QUEIROZ, M.; NOGUEIRA, A. B. Avaliação das relações cognitivas e motoras na aquisição instrucional das habilidades para a aprendizagem da linguagem escrita. *Revista Ensaio: avaliação e políticas públicas em educacional*, Rio de Janeiro, v. 10, n. 37, p. 493-501, 2002.
- CAETANO, M. J. D.; SILVEIRA, C. R. A.; GOBBI, L. T. B. Desenvolvimento motor de pré escolares no intervalo de 13 meses. *Revista Brasileira de Cineantropometria e Desempenho Humano*, Florianópolis, v. 7, n. 2, p. 5-13, 2005.
- CASE-SMITH, J. *Occupational therapy for children*. Missouri: Elsevier Mosby, 2005.
- CRUZ, D. M. C. Terapia Ocupacional com crianças portadoras de necessidades especiais: uma análise do origami como proposta de estimulação psicomotora. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 10, n. 2, p. 119-128, 2002.
- CRUZ, D. M. C.; EMMEL, M. L. G. O brinquedo e o Brincar na estimulação da função manual de crianças pré-escolares com deficiência física. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 15, n. 1, p. 7-17, 2007.
- DE MEUR, A.; STAES, L. *Psicomotricidade: educação e reeducação: níveis maternal e infantil*. São Paulo: Editora Manole, 1991.
- FERNANDES, C. T.; DANTAS, P. M. S.; MOURÃO-CARVALHAL, M. I. Desempenho psicomotor de escolares com dificuldades de aprendizagem em cálculos. *Revista Brasileira de Estudos Pedagógicos*, Brasília, v. 95, n. 239, p. 112-138, 2014.
- FIGUEIREDO, M. O.; EMMEL, M. L. G.; VILLA, M. B. Terapia ocupacional e alunos com dificuldades de aprendizagem: análise de uma intervenção nos aspectos psicomotores. *Temas Sobre Desenvolvimento*, São Paulo, v. 20, n. 110-111, p. 125-131, 2015.

- FIGUEIREDO, M. O.; EMMEL, M. L. G.; ROSÁRIO, P. Caracterização do desenvolvimento psicomotor de alunos com dificuldade de aprendizagem. In: CONGRESSO INTERNACIONAL GALEGO-PORTUGUÊS DE PSICOPEDAGOGIA, 12., 2013, Braga. *Anais...* Braga: Universidade do Minho, 2013. p. 5336-5350. Disponível em: <<http://webs.ie.uminho.pt/xiigp/at11.pdf>>. Acesso em: 23 maio 2016.
- FONSECA, F. R.; BELTRAME, T. S.; TKAC, C. M. Relação entre o nível de desenvolvimento motor e variáveis do contexto de desenvolvimento de crianças. *Revista da Educação Física*, Maringá, v. 19, n. 2, p. 183-194, 2008.
- GALLAHUE, D. L. Educação Física desenvolvimentista. *Cinergis*, Santa Cruz do Sul, v. 1, n. 1, p. 7-17, 2000.
- GALLAHUE, D. L.; OZMUN, J. C.; GOODWAY, J. D. *Compreendendo o desenvolvimento motor: bebês, crianças, adolescentes e adultos*. Porto Alegre: AMGA, 2013.
- GIARDINETTO, A. R. D. S. B. et al. A importância da atuação da terapia ocupacional com a população hospitalizada: A visão dos profissionais da área da saúde. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 17, n. 1, p. 63-69, 2009.
- GRIGOLATTO, T. et al. Intervenção terapêutica ocupacional em CTI pediátrico: um estudo de caso. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 16, n. 1, p. 37-46, 2008.
- HAYWOOD, K. M.; GETCHELL, N. *Desenvolvimento motor ao longo da vida*. Porto Alegre: Artmed, 2004.
- JACOBSON, N. S. et al. Methods for defining and determining the clinical significance of treatment effects: description, application and alternatives. *Journal of Consulting and Clinical Psychology*, Washington, v. 67, n. 3, p. 300-307, 1999.
- JACOBSON, N. S.; TRUAX, P. Clinical significance: a statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology*, Washington, v. 59, n. 1, p. 12-19, 1991.
- KENNY, D. A. A quasi-experimental approach to assessing treatment effects in the nonequivalent control group design. *Psychological Bulletin*, California, v. 82, n. 3, p. 345-362, 1975.
- KNOX, S. Avaliação lúdica de pré-escolares: a escala Knox. In: PARHAM, L. D.; FAZIO, L. S. *A recreação na terapia ocupacional pediátrica*. São Paulo: Santos, 2002. p. 2-22.
- MARONESI, L. C. et al. Análise de uma intervenção dirigida ao desenvolvimento da coordenação motora fina, global e do equilíbrio. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 23, n. 2, p. 273-284, 2015.
- MEDINA, J.; ROSA, G. K. B.; MARQUES, I. Desenvolvimento da organização temporal de crianças com dificuldades de aprendizagem. *Revista da Educação Física*, Maringá, v. 17, n. 1, p. 107-116, 2006.
- MEDINA-PAPST, J.; MARQUES, I. Avaliação do desenvolvimento motor de crianças com dificuldade de aprendizado. *Revista Brasileira de Cineantropometria e Desempenho Humano*, Florianópolis, v. 12, n. 1, p. 36-42, 2010.
- NICOLA, M. *Psicomotricidade: manual básico*. Rio de Janeiro: Revinter, 2004.
- NICHOLLS, D. et al. Teaching psychomotor skills in the twenty-first century: revisiting and reviewing instructional approaches through the lens of contemporary literature. *Medical Teacher*, London, v. 38, n. 10, p. 1056-1063, 2016.
- NUNES, S. B. F. et al. Retratos do cotidiano de meninos de cinco e seis anos: a atividade de brincar. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 21, n. 2, p. 275-287, 2013.
- OLIVEIRA, A. F. S.; SOUZA, J. M. A importância da psicomotricidade no processo de aprendizagem infantil. *Revista Fiar: Núcleo de Pesquisa e Extensão*, Ariquemes, v. 2, n. 1, p. 125-146, 2013.
- OLIVEIRA, G. C. *Psicomotricidade: educação e reeducação num enfoque psicopedagógico*. Petrópolis: Editora Vozes, 2002.
- OLIVEIRA, I. C. C.; FRANCISCHINI, R. Direito de brincar: as (im)possibilidades no contexto de trabalho infantil produtivo. *Psico-USF*, Itatiba, v. 14, n. 1, p. 59-70, 2009.
- PARK, W. H.; JEONG, Y. S.; BORNMAN, J. The effect of psycho-motor play on motor and body perception competence for young children with developmental. *South African Journal of Occupational Therapy*, Pretoria, v. 41, n. 1, p. 1-6, 2011.
- PINTO, M. Vigilância do desenvolvimento psicomotor e sinais de alerta. *Revista Portuguesa Clínica Geral*, Lisboa, v. 25, n. 6, p. 677-687, 2009.
- PÔRTO, C. M. V.; IBIAPINA, S. R. Ambiente aquático como cenário terapêutico ocupacional para o desenvolvimento do esquema corporal em síndrome de down. *Revista Brasileira de Promoção da Saúde*, Fortaleza, v. 23, n. 4, p. 389-394, 2010.
- ROSA NETO, F. *Manual de avaliação motora*. Porto Alegre: ArtMed, 2002.
- ROSA NETO, F. et al. Desenvolvimento motor de crianças com indicadores de dificuldades na aprendizagem escolar. *Revista Brasileira de Ciência e Movimento*, Taguatinga, v. 15, n. 1, p. 45-51, 2007.
- ROSA NETO, F. et al. A importância da avaliação motora em escolares: análise da confiabilidade da escala do desenvolvimento motor. *Revista Brasileira de Cineantropometria e Desempenho Humano*, Florianópolis, v. 16, n. 1, p. 422-427, 2010.
- ROSA NETO, F. et al. O esquema corporal de crianças com dificuldade de aprendizagem. *Revista Semestral da*

Associação Brasileira de Psicologia Escolar e Educacional, Uberlândia, v. 15, n. 1, p. 15-22, 2011.

SCALHA, T. B. et al. A importância do brincar no desenvolvimento psicomotor: relato de experiência. *Revista de Psicologia da UNESP*, Assis, v. 9, n. 2, p. 79-92, 2010.

SHANDISH, W. R. Quasi-experimental designs. In: SMELSER, N. J.; BALTES, P. B. *International Encyclopedia of the Social & Behavioral Sciences*. Pergamon: Oxford, 2001. p. 12655-12659.

SILVA, C. C. B.; PONTES, F. V. A utilização do brincar nas práticas de terapeutas. *Revista de Terapia Ocupacional da Universidade de São Paulo*, São Paulo, v. 24, n. 3, p. 226-232, 2013.

SIMON, C. J. Uso de la actividad y análisis de la actividad. In: HOPKINS, H. L.; SMITH, H. D. *Willard Spackman: Terapia Ocupacional*. Madri: Panamericana, 2001. p. 281-29.

SOUZA, A. C.; MARINO, M. S. F. Atuação da Terapia Ocupacional com criança com atraso no desenvolvimento neuropsicomotor. *Cadernos de Terapia Ocupacional da UFSCar*, São Carlos, v. 21, n. 1, p. 149-153, 2013.

VASCONCELLOS, M. J. E. *Pensamento sistêmico: o novo paradigma da ciência*. Campinas: Papirus, 2002.

VIEIRA, L. F. Santos et al. Análise da aprendizagem perceptivo-motora de crianças de 7 e 8 anos da rede de ensino público de Maringá – PR. *Revista da Educação Física*, Maringá, v. 15, n. 2, p. 39-48, 2004.

VILLA, M. B.; AGUIAR, A. A. R., DEL PRETTE, Z. A. P. *Intervenções baseadas em evidências: aplicações do método JT*. São Carlos: EDUFSCar, 2012.

WILLRICH, A.; AZEVEDO, C. C. F.; FERNANDES, J. O. Desenvolvimento motor na infância: influência dos fatores de risco e programas de intervenção. *Revista Neurociências*, São Paulo, v. 17, n. 1, p. 51-56, 2009.

Author's Contributions

Sara Domiciano Franco de Campos and Mirela de Oliveira Figueiredo were responsible for the conceptualization and writing of the text, font organization and analyses. Sheila Maria Mazer-Gonçalves, Elisandra dos Santos and Letícia Carrillo Maronesi were responsible for the revision of the article. All authors approved the definitive version of the text.

Notes

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