The Effects of Neuropsychopedagogical Intervention on Children with Learning Difficulties

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Abstract The aim of this study was to evaluate the effects of neuropsychopedagogical intervention (INPp) on the academic performance of students with learning difficulties (LD). A total of 4,184 children aged between 6 and 8 years (± 7.23) of both genders participated in the present study. They were divided into four groups (A1 –1151 children who did not present LD and who underwent INPp; A2 – 1151 children without LD who did not undergo INPp; B1 - 942 children who presented AD and who underwent INPp; B2 - 942 children with LD and who did not undergo INPp). The INPP was developed through the systematic practice of 04 playful activities, in three weekly sessions, lasting 45 minutes each for 18 sessions (± 2 months). In order to evaluate the effects of the INPP, the participants were submitted to the following protocols: a) Dual Choice Mental Processing Test (DMCPT) ; b) Rapid Automatized Naming (RAN); c) Assessment of academic performance in Portuguese and Mathematics. All protocols were approved by the UFRJ ethics committee (opinion no. 517,483) and carried out in the school environment. Our results show that children in group A1 when evaluated after INPp presented an 18% reduction ($p<0.05$) in the response time obtained in the DMCPT and children in group B2 presented a significant reduction ($p<0, 01$) 40% in response time. When evaluated post INPp in relation to RAN, children in group A1 showed a reduction of 14.29% ($p<0.05$) and children in group B1 a reduction of 23% ($p<0.01$) in automated color naming time. Finally, when evaluated in relation to academic performance, after INPp, children in group A1 showed an increase of 16% ($p<0.05$) and children in group B1 an increase of 46.23% ($p<0.01$) in the number of correct answers.

Keywords: *children, early grades, executive functions, learning difficulties, Neuropsychopedagogy*

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1. Introduction

In the social scenario, the child appears who presents the difficulty and does not know how to deal with it. At school, education professionals seek to help in whatever way they can, but their limitations in the face of overcrowded classes and lack of time for effective dedication make this child without the differentiated help he or she would need to develop cognitively and aim for bigger flights. for their academic development [1,2,3].

Social vulnerability among the means of social, educational and psychological research, or as some relate other terms such as at-risk families, poor families, low-income families, low-income families, among others, may denote the same meaning, among several factors that can act as risk factors in the development of young people, in order to make them vulnerable [4,5,6].

One of the main questions surrounding such situations points to how schools can contribute to circumventing or at least minimizing the gaps that may remain in development and how to adequately encourage children from situations of neglect and maltreatment to that they can overcome the traumas suffered and achieve good academic performance. It is evident, therefore, that school failure can be directly more present in the lives of students who are children of parents with little education, students who are from lower social classes and who are even more present in boys [7,8,9,10,11].

Studies highlight that academic performance is only adequate when what the student has learned in the classroom is extended and incorporated into other content, previously learned, and manifests itself when evaluated. Students who are able to retain what has been taught are able to obtain a satisfactory grade for their performance [1,2,8,9,10].

Therefore, it is desirable that the learning process is coherent with the functional development of the nervous system, respecting the child's nature. The opposite of this can negatively "mark" the child's relationship with learning. As obvious as this may seem, it is still overlooked in some pedagogical practices [11,12,13].

It is extremely important that the teaching process is based on the development of skills and not just content, for this reason it is justified that the teacher base their actions on the interface between NEUROSCIENCES, PEDAGOGY AND COGNITIVE PSYCHOLOGY, which will make their pedagogical actions and their assessments respect the child's maturational aspects and abilities [14].

In an attempt to contribute to the reduction of such difficulties mentioned above, Neuropsychopedagogy developed predominantly remediation and reintegration interventions evidenced through intervention programs that involve promotion of cognitive health and stimulation of cognitive skills in students, in order to enhance the processes and lead to short to long term benefits an improvement in the development of fundamental skills of these students [12,13,14].

Based on the aforementioned, the aim of this study was to evaluate the effects of neuropsychopedagogical intervention on the academic performance of students with learning difficulties and to investigate a possible relationship between school performance with the following variables: gender, socioeconomic level and parental education.

2. Materials and Methods

2.1. Ethical Aspects

The protocols used were approved by the ethics committee of the Federal University of Rio de Janeiro (opinion n. 517,483). The children who participated in this research participated in a meeting, with the presence of their respective guardians, to become aware of all its procedures, taking into account bioethical principles. After the clarifications and free to choose to participate or not in the research, each responsible person signed the Free and Informed Consent Term.

All children participating in this study (experimental and controls, with or without learning difficulties, had access to the proposed activities and, in no way, were deprived of the activities relevant to the study, as recommended by the Ethics Committee, and may even cancel their participations at any time.

2.2. Participants

A total of 4,184 children aged between 6 and 8 years (± 7.23), of both genders (Girls = 1,981; Boys = 2,203), from the city of São Fidélis/RJ, who were divided into four groups (A1) participated in this study. -1151 children who did not have learning difficulties and who underwent the Neuropsychopedagogical Intervention (INPp); A2 - 1151 children without learning difficulties who did not undergo the INPp; B1 - 942 children who had learning difficulties and who underwent the INPp; B2 - 942 children with learning difficulties and who did not undergo the INPP).

The inclusion criteria were no complaints of visual or hearing acuity, no history of language or speech alterations, no use of neuropsychiatric medications, no complaints of behavioral changes. In addition, subjects who did not meet the inclusion criteria were excluded.

Students were selected based on good academic performance in reading, writing and math and without learning complaints or visual and hearing impairment, with behavioral changes or using neuropsychiatric medications. These aspects were verified by the teachers in the classroom and also through the students' health records and school records.

2.3. Assessment Procedures

To achieve that objective, the children were initially submitted to a socioeconomic questionnaire, through which the level of education of the parents was also verified, as well as their previous pathological and physiological histories.

Subsequently, the children were submitted to the Dual Choice Mental Processing Test (DMCPT) [15], which consists of evaluating the time that elapses from the presentation of a stimulus not anticipated at the beginning of the response, through the following characteristics: three squares are presented on the screen. One of the squares will be positioned at the top center of the screen to light up as a warning light, warning that a green light will appear after one (1) second. For each participant, 100 attempts were made.

After 10 minutes of rest, the child was submitted to Rapid Automatized Naming (RAN) [16]. The RAN continuously measures performance on the rate of sequential naming of common stimuli, that is, the rate at which the child sequentially verbalizes a list containing basic symbols. This test is composed of subtests for naming colors, digits, letters and objects.

In the present study, only the color subtest consisting of green, red, yellow, black, blue and yellow was used. The subject should name the colors as quickly as possible. The test was only applied after guidance and verification that the child knew all the colors that would be applied.

Finally, 24 hours later, they were submitted to the identification of school performance, through an assessment prepared by the teacher of the respective children, containing ten Portuguese language questions and 10 mathematical logical reasoning questions.

2.4. Intervention Procedures

The neuropsychopedagogical intervention (INPp) was developed through the systematic practice of 04 playful activities, in three weekly sessions, lasting 45 minutes each for 18 sessions (± 2 months). The activities proposed in the INPP required control over the motor perceptual system, attention, automated naming capacity, reading and mathematical logical reasoning and always occurred with the application by the teacher of the participating children's class. The order of activities was the same for all participants, starting in the first session of the week with training A ("Dominó I already know to read"; "Sí-la-bas Memory"; Colored Lynx; Mathematical Tic-Tale), and the next and the next with training B (Game -old- mathematician; Colored Lynx; Sí-la-bas Memory; Dominoes I already know how to read). The beginning of the practices always took place at the 'beginner' difficulty level. Therefore, all activities start at the easiest level and progression takes place depending on the individual's performance.

3. Results

Our results initially show that of the 1884 children with learning difficulties, 53.98% (n=1017) are male and 46.01% (n=867) are female. As for the 2,302 children without learning difficulties, it can be seen that 52.47% (n=1208) of the children were male and 47.52% (n=1094) were female. When trying to establish a direct relationship between the variables sex and school performance, it can be seen that for an r=0.453 it obtained a p<0.05. Despite being significant, as the value of r is far from "1" or "-1" this association can be considered weak.

Regarding socioeconomic data, of the 1884 children with learning difficulties, it can be seen that 11.00% (n=226) belonged to class E; 6.26% (n=118) belonging to class D; 17.25% (n= 325) belonging to class C; 44.42% (n=837) belonged to class B and 20.06% (n=378) belonged to class A. Regarding children without learning difficulties, 8.81% (n=203) belonged to class E; 17.68% (n=407) belonging to class D; 30.49% (n=702) belonging to class C; 26.71% (n=615) were from class B and 16.29% from class A. To observe a possible association between socioeconomic status and a direct relationship with the situation of learning competence (children with and without learning difficulties Logistic Regressions statistic was used, considering that socioeconomic level can be a predictive factor for learning difficulties, which was not significant because a p>0.05 was revealed.

When analyzing the educational levels of the guardians of children with learning difficulties, it can be seen that only 5.57% (n=105) of the children had their guardians without having ever attended school regularly; 13.53% (n=255) presented their guardians with incomplete Elementary Education; 16.40% (n=309) had their guardians completed Elementary School; 44.47% (n=838) had their parents or guardians with Complete High School and 20.01% (n=377) with guardians attending or having completed higher education. Regarding children without learning difficulties, it can be seen that only 9.68% (n=223) of them had their guardians without any study; 13.03% (n=300) had their guardians with incomplete Elementary School; 31.40% (n=723) with guardians who have completed Elementary Education; 23.80% (n=548) had guardians who had completed high school and 22.06% had their guardians attending or having completed higher education.

By establishing a statistical correlation of the educational level of those responsible, a value of r=0.563 and a p<0.05 was obtained in a unique way for Higher Education, which, despite being significant, due to the value of "r", this correlation can be considered weak, which is corroborated by the degree of inter-correlations of educational levels presented with the fact that the child has or not a learning disability through the SSA (Similarity Structure Analysis), which revealed a p>0.05 for all possible subgroup possibilities of one of the analyzed datasets.

Regarding the performance of children in the DMCPT test, it can be seen that children in group A1 initially presented a variation in their results between 0.741 and 0.982 seconds, with an average performance equal to 0.860 seconds. When evaluated after the INPp, developed in this study, it is noted that there was a reduction of 18%

(p<0.05) in the motor reaction time of these children, as the average presented was 0.702 seconds with a variation of results between 0.598 and 0.803 seconds. Children in group A2, that is, children who performed the two assessments in the same period of time as children in group A1, initially presented a variation of results between 0.754 and 1.118 seconds, with an average performance equal to 0.843 seconds. When evaluated for the second time, it can be seen that the average performance was equal to 0.903 seconds and the variation in results was equal to 0.763 and 1.106 seconds.

A superiority of group A1 in relation to group A2 can be noticed, which, through the analysis of variance, proved to be significant, as for an F= 27.19 it revealed a p<0.01.

With regard to children with learning difficulties, it can be seen that children who underwent the intervention developed in this study (B1) initially presented a range of results between 1.283 and 2.117 seconds, with an average performance equal to 1.833 seconds. When evaluated after the period of neuropsychopedagogical intervention, the motor reaction time of these children showed a significant reduction (p<0.01) of 40%, as the average performance was 1.096 seconds with a variation between 0.744 and 1.387 seconds. On the other hand, children in group B2, that is, who only performed the tests in the same period of time as children in group B1, initially presented a variation in results between 1.483 and 2.108 seconds, with an average performance equal to 1.808 seconds. In the second evaluation, the variation of results was 1.603 and 2.189 seconds with an average performance equal to 1.876 seconds.

When establishing an intergroup comparison through analysis of variance, there was a superiority of group B1 in relation to group B2, because for an F= 29.48 a p <0.01 was revealed, which shows that the intervention is very likely Neuropsychopedagogical positively influenced the perceptual-motor development of children with learning difficulties and consequently contributed to the improvement of these children for the planning of a task that involves inhibitory control, processing speed and detailed analysis.

When evaluated in relation to the ability of automated color naming, children without learning difficulties, who participated in the neuropsychopedagogical intervention developed in this study (A1), initially presented a variation of results between 26.21 and 31.52 seconds, with a performance average equal to 28.96 seconds. After the intervention period, it is possible to notice a reduction of 14.29% (p<0.05) in the time of naming these individuals, that is, the average performance was equal to 24.65 seconds with a variation of results between 22.98 and 26.15 seconds. When observing the results of children in group A2, it can be seen that initially the variation of results was between 24.54 and 31.21 seconds, with an average performance equal to 27.87 seconds, and that in the second assessment this average performance was of 27.71 seconds, with a range of results between 25.96 and 29.88 seconds. It is possible to notice that there is a superiority of children belonging to group A1 in relation to children in group A2, of 3.06 seconds, a difference that, through an analysis of variance for an F=31.46, revealed a p <0.05.

From a brief analysis of the results, it is possible to notice that children in group B1 managed to obtain a difference of 9.68 seconds less in performing the task in relation to children in group B2. Such difference proved to be significant through the analysis of variance because for an F= 39.76 it revealed a p<0.01.

Finally, when analyzing the academic performance of children without learning difficulties, our results show that initially the children in group A1 had an average performance equal to 15 correct answers and after the intervention period this performance was 17.40 correct answers. an increase of 16% (p<0.05) in the number of correct answers. On the other hand, children in group A2, who only took the two assessments, that is, who were not submitted to NPIP, presented an average performance of 15.10 correct answers in the first assessment and 15.30 correct answers in the second assessment. When establishing an intergroup comparison on the differences obtained in a PRExPOS direction, a p<0.05 was obtained for an F=43.23, thus proving the superiority of group a1 in relation to group A2.

The children in group B1 presented, before the INPP, an average performance equal to 9.31 correct answers and in the second assessment they presented a significant increase of 46.23% (p<0.01), since the average of correct answers was 13.60. On the other hand, children in group B2, that is, children with learning difficulties who were not submitted to INPP, obtained a mean score of 8.5 in the first assessment and 9.4 points in the second assessment. The superiority of academic performance of children in group B1 in relation to children in group B2 is even more evident through the analysis of variance, as for an F= 52.19 it revealed a p<0.01, which shows that the improvement in academic performance was not by chance, but very likely by the effects of INpp.

4. Discussion

It is possible to notice that most individuals are characterized by participating in classes B, C and D, which are divided almost equally between male and female. Most studies on cognitive development and executive functions in children have focused on their atypical development, establishment of psychometric parameters, knowledge of their underlying mechanisms and correlation with cognitive performance, and investment in knowledge of environmental effects has been neglected [17,18,19]. Evidence suggests that there is no clear association between childhood socioeconomic status and executive function performance. This association seems to be mediated, especially the factors associated with the quality of education offered to these children [20,21,22,23] .

Studies point out that complaints of learning difficulties among students in public schools in the first years of elementary school may be more justified by cognitive weaknesses, predominantly in inhibitory control, working memory and cognitive flexibility, than by the influence of social and environmental factors. Thus, it is believed that unfavorable educational environments can compromise the development of skills related to executive functions [19,21,23].

Several studies confirm that when children are systematically submitted to activities that make use of the applicability of knowledge arising from neurosciences, cognitive psychology and learning theories (Children in Groups A1 and B1), they perform better in executive function tests, here demonstrated in these studies through the DMCPT and RAN tests, when compared to children who continue to attend a traditional educational environment (Children in groups A2 and B2). It is important to remember that higher scores on both the DMCPT and RAN tests represent worse results [24,25,26,27].

Data suggest that academic skills improve considerably after INPP, which indicates an important contribution of the intervention developed in this study in bringing benefits to the processes of acquisition of academic skills for reading and writing and mathematics [28,29,30]. It is believed, therefore, that the main contributions of this study are the paths it can offer for pedagogical purposes (adjusting executive function training to better fit specific groups of students), therefore serving as a help to teachers, as well as serve as a guide for educational public policies. [24,25,29,30].

5. Conclusions

From our results, it can be concluded that the gender of the children, the socioeconomic level and the level of education of the parents had an absolutely weak influence regarding the factor of the child presenting or not with learning difficulties. These results suggest that the design of the assessment of the school records of children in early grades of elementary school still needs to be improved, as at this age children are at the beginning of school life.

Our results also allow us to conclude that the Neuropsychopedagogical Intervention (INPp) most likely enabled its practitioners to improve their temporal dimensions, which is directly reflected in executive functioning, given the significant percentages of children who were part of groups A1 and B1 in the PTMD test and also in the automated naming test.

It can, therefore, be believed that the increased percentages mentioned above most likely caused children who were submitted to INPP to show an improvement in their attentional systems, memory systems and executive functioning, which positively impacted academic performance, since both groups obtained, after INPP, a significant increase in correct answers.

Thus, it is evident that they are fundamental principles for us to be successful in adopting an educational paradigm compatible with the nervous system, fostering discussions between educators and neuropsychopedagogists that will lead to scientific research that address issues of importance and interest for teachers, where neurosciences and psychology being illuminated by theories of learning, they lead to specific predictions about what might work in education, targeting important perspectives on the viability of these ideas and how they might be implemented in educational settings.

Acknowledgements

References

[1] Jovarini, N. V., Leme, V. B. R., Correia-Zanini, M. R. G. (2018). Influence of Social Skills and Stressors on Academic Achievement in the Sixth-Grade. *Paidéia (Ribeirão Preto),* 28, e2819, 2018.

[2] Dunst, C.J., Trivette, C.M., Hamby, D.H. Relationships between family risk and opportunity factors and parent and child functioning. *Journal of Educational and Developmental Psychology*, 4(2): 10-23, 2014.

[3] Farah, M.J., Shera, D.M., Savage, J.H., Betancourt, L., Giannetta, J.M., Brodsky, N.L., Malmud, E.K.k., Hurt, H. Childhood poverty: Specific associations with neurocognitive development. *Brain Research*. 2006; 1110(1): 166-174.

[4] Leme,V.B.R., Marturano, E.M. Preditores de comportamentos e competência acadêmica de crianças de famílias nucleares, monoparentais e recasadas. Psicologia: Reflexão e Crítica, 27(1), 153-162, 2014.

[5] Sbicigo, J.B., Dell'aglio, D.D. Family environment and psychological adaptation in adolescents. *Psicologia: Reflexão e Crítica* (UFRGS. Impresso), 3: 615-622, 2012.

[6] Matte-Gagné, C., Bernier, A. Prospective relations between maternal autonomy support and child executive functioning: investigating the mediating role of child language ability. *Journal of Experimental Child Psychology,* 110, 611-625, 2011.

[7] Sbicigo, J. B., Abaid, J. L.W., Dell'aglio, D.D., Salles, J.F. Nível socioeconômico e funções executivas em crianças/adolescentes: revisão Sistemática. *Arquivos Brasileiros de Psicologia*, Rio de Janeiro, 65 (1): 51-69, 2013.

[8] Dunn, J. R. Health behavior vs the stress of low socioeconomic status and health outcomes. *Journal of the American Medical Association*, 303, 1199-1200, 2010.

[9] Farah, M.J, Betancourt, L., Shera, D.M., Savage, J.H., Giannetta, J.M., Brodsky, N.L., Malmud, E.K., Hurt, H. Environmental stimulation, parental nurturance and cognitive development in humans. *Developmental Science.* 2008; 11(5): 793-801.

[10] Will Crescioni, A., Ehrlinger, J., Alquist, J.L., Conlon, K.E., Baumeister, R.F., Schatschneider, C., Dutton, G.R. High trait self-control predicts positive health behaviors and success in weight loss. *Journal of Health Psychology*, 16(5): 750-9, 2011.

[11] Bolsoni-Silva, A.T., Mariano, M. L Práticas educativas de professores e comportamentos infantis, na transição ao primeiro ano do ensino fundamental. Estudos e Pesquisas em Psicologia, *14*(3), 814-833, 2014.

[12] Rocha, A. C. M. A., Cardoso, F.B., Sholl-Franco, A. Treinamento e capacitação de professores e profissionais de educação: importância para o Ensino Infantil. In: Marcia Barr. (Org.). *Neurociências e Educação na primeira infância*: progressos e obstáculos. 01ed.Brasília: Senado Federal, 2016, v. 01, p. 109-120.

[13] Diamond, A. Interventions shown to aid executive function evelopment in children 4 to 12 years old. *Science*, 333(6045), 959964, 2011.

[14] Fülle, A., Cardoso, F.B., Rosa, B.M.H., Russo, R.M.T. Neuropsicopedagogia: Ciência da Aprendizagem. In: Rita Margarida Toler Russo. (Org.). *Neuropsicopedagogia Institucional*. 1ed.Curitiba: Juruá, 2018, 25-34.

[15] Macedo, L.S., Pina, I.L., Sequeira, M.E.A., Silva, I.L., Cardoso, F., Beresford, H. O valor da estimulação cortical voltado para o déficit de atenção de alunos com síndrome de Down. *Ciências & Cognição*, 15 (3), 13-22, 2010.

[16] Saraiva, R.A., Moojen, S.M.P., Munarski, R. *Avaliação da compreensão leitora de textos expositivos para fonoaudiólogos e psicopedagogos*. São Paulo: Casa do Psicólogo, 2006.

[17] Amicarelli, A. R., Kotelnikova, Y., Smith, H. J., Kryski, K. R., & Hayden, E. P. Parenting differentially influences the development of boys' and girls' inhibitory control. *British Journal of Developmental Psychology*, 36(3), 371-383, 2018.

[18] Bindman, S.W., Hindman, A.H., Bowles, R.P., Morrison, F.J. The contributions of parental management language to executive function in preschool children. *Early Childhood Research Quarterly*, 28(3), 529-539, 2013.

[19] Brito, N.H., Noble, K.G. Socioeconomic status and structural brain development. Frontiers in Neuroscience, 8, 1-12, 2014.

[20] Leonard, J.A., Mackey A.P., Finn A.S., Gabrieli, J.D.E. Differential effects of socioeconomic status on working and procedural memory systems. *Frontiers in human Science*, 9, 1-9, 2015.

[21] Arán-Filippetti, V. Verbal fluency according to task type, time interval and socioeconomic status in school-aged children. *Anales De Psicología*, 27(3), 816-826, 2011.

[22] Chan, R., Shum, D., Toulopoulou, T., Chen, E. Assessment of executive functions: review of instruments and identification of critical issues. *Archives of Clinical Neuropsychology*, 23, 201-216, 2008.

[23] John A.M.St., Kibbe, M., Tarullo, A.R. A systematic assessment of socioeconomic status and executive functioning in early childhood. *Journal of Experimental Child Psychology* 178, 352-368, 2019.

[24] Shipstead, Z., Redick, T.S., Engle, R.W. Is working memory training effective? Psychological Bulletin, 138(4), 628-654, 2012.

[25] Zhang, Q., Wang, C., Zhao, Q., Yang, L. Buschkuehl, M., Jaeggi, S.M. The malleability of executive function in early childhood: Effects of schooling and targeted training. *Developmental Science*. 1-15, 2019.

[26] Goldin, A. P., Hermida, M. J., Shalom, D. E., Elias Costa, M., Lopez-Rosenfeld, M., Segretin, M. S., Fernández-Slezak, D., Lipina, S. J., & Sigman, M. Far transfer to language and math of a short software-based gaming intervention. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(17), 6443-6448, 2014.

[27] Di Lieto, M. C., Castro, E., Pecini, C., Inguaggiato, E., Cecchi, F., Dario, P., … Sgandurra, G. Improving Executive Functions at School in Children With Special Needs by Educational Robotics. *Frontiers in Psychology*, 10:02813, 2020.

[28] Au, J., Jaeggi, S.M., Buschkuehl, M. Effects of non-symbolic arithmetic training on symbolic arithmetic and the approximate number system. *Acta Psychologica,* 185, 1-12, 2018.

[29] Duckworth, A. L., Taxer, J. L., Eskreis-Winkler, L., Galla, B. M., and Gross, J. J. (2019). Self-control and academic achievement. *Annual Review of Psychology*. 70, 373-399, 2019.

[30] Smid, C. R., Karbach, J., Steinbeis, N. Toward a science of effective cognitive training. *Current Directions in Psychological Science*. 29, 1-7, 2020.