

RESEARCH PROJECT

Evaluation of child development after the implementation of the Neuro Playground program

Summary of the technical research report

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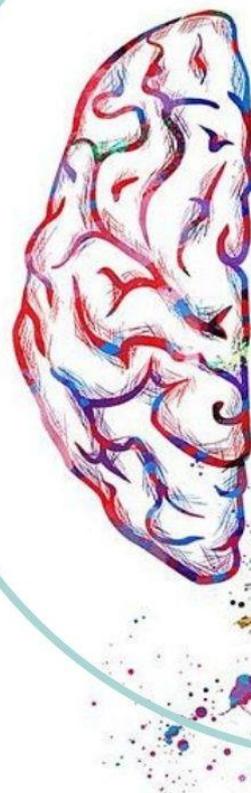
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Translator: Daniel Felipe Jaramillo Giraldo

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Context

The present technical report presents the results of a research project conducted through a partnership between Caja de Compensación Familiar de Antioquia, Comfama, (a Colombian family social fund) and the Faculty of Education of the University of Antioquia, as part of the agreement 24502 of 2021, given in Medellín-Colombia.

This report summarizes a concluded research project that evaluated the results in child development—in the sensory, motor, socioemotional and learning readiness dimensions—after the application of the Neuro Playground, a program of the U.S. organization The Family Hope Center. This program proposes a series of activities to foster children's neurodevelopment and brain organization. In this case, a group of children from the preschools of Comfama in Rionegro and Bello centers, in kindergarten, pre-kindergarten and transitional kindergarten grades, were compared with a control group of children from Comfama Pedregal preschool, who were not exposed to the training. A second independent group of first graders from the Comfama Bello school was also tested in three evaluations. This report, addressed to non-academic audiences, has four sections that describe and explain each phase of the research, and puts the focus on the presentation of the results for each group evaluated.

The first section presents the objectives formulated for the research, the data required to situate the reader in the scope of the research, and the contents of this document.

The second section summarizes the methodology of the research project by means of two graphs that highlight its main characteristics.

The third section displays a description of the research results for each grade and dimension evaluated. It begins with the Rionegro, Bello and Pedregal pre-kindergarten, continuing, always in the same order, with kindergarten, then transitional kindergarten, and closing with a group of children with disabilities. Then the results of the children from first grade-2021 are presented, including the group of children with disabilities. For each grade, the reader finds the results of the contrast between experimental and control groups.

The fourth section presents the conclusions and recommendations. The most relevant findings of the whole research are specified in coherence with the four specific objectives.

How was the evaluation of child development?

As a fundamental step in the conception of the assessment instrument, and before the pre-test evaluation of child development, a tracking of scales for measuring child development, with national and international scope, was conducted. It was considered that the measurement scales should provide elements to describe in detail the processes of the children in the pre-kindergarten, kindergarten, transitional kindergarten and first grade levels, and should allow, at the same time, to identify improvements in child development and should respond to the application of the training, both in relation to Comfama's educational model as well as to the development proper to the child's specific age.

The research team received statistical, methodological and thematic advice from expert professors from the University of Antioquia. They provided guidance in the identification of the children's achievements in terms of fundamental learning, according to grade and chronological age, as well as the implication of "Neuro Playground" intervention program in children's neurodevelopment.

According to the mentioned above, two evaluations (pre-test and post-test) were applied in the pre-kindergarten, kindergarten and transitional kindergarten grades. They were assessed on three response scales: *started*, *in process* and *achieved*, which coincided with the scale used by Comfama in both the control and experimental groups.

The first grade of Comfama school did not have a control group; therefore, it was decided to apply three assessments of child development to the same group at the pre-test, intermediate and post-test stages. As a non-probabilistic group, the children with a diagnosis of disability were evaluated using the same instrument and assessment scale that was applied to the other children participating in the research.

Objectives of the research project

General objective

To evaluate the results in child development of sensory, motor, socioemotional and learning readiness functions after the implementation of the Neuro Playground training, a program of The Family Hope Center organization, in a sample of 170 children belonging to the Bello and Rionegro preschool and the Bello educational center of Comfama by means of a developmental assessment test.

Specific objectives

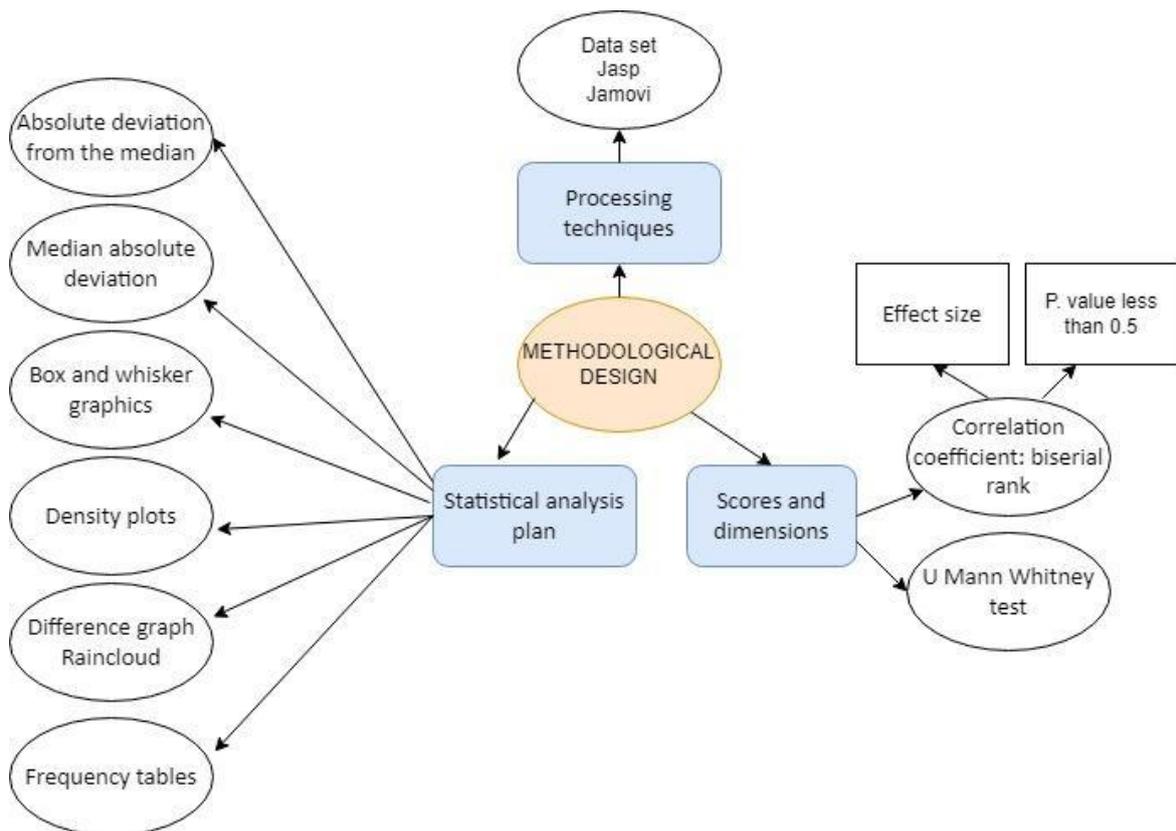
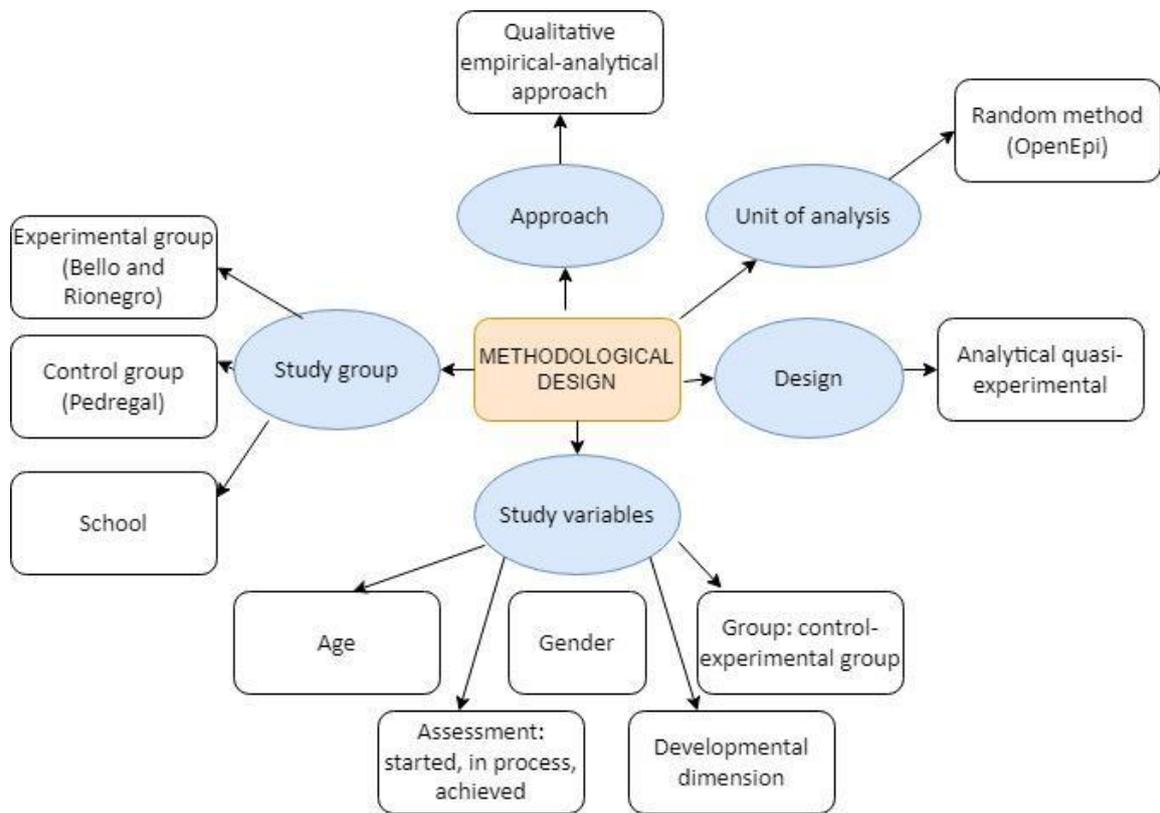
To design an evaluation instrument consisting of an assessment test of children's development in sensory, motor, socioemotional and learning readiness functions and to apply it as a pre-test and post-test.

To apply the evaluation instrument to the experimental and control groups at various stages of the research, following methodological principles of quasi-experimental studies.

To evaluate in a differentiated way the sample of children of first grade of elementary school in three moments of the research: before, during and after the application of the Neuro Playground program.

To compare the pre-test and post-test results of the experimental and control groups and to identify the impact of the *Neuro Playground* program on the sensory, motor, socioemotional and learning readiness development of the participating children.

METHODOLOGICAL FEATURES



SUMMARY OF THE RESULTS

comparison of the groups

PRE-KINDERGARTEN

Comparison of pre-test and post-test results between experimental and control groups in kindergarten grade

The results of the training demonstrate a significant effect on the development of the pre-kindergarten children. A data that allows us to affirm this is the effect size, which indicates that the performance was better in the post-test. At that point, all groups showed statistically significant differences, a characteristic that indicates that there were relevant changes.

When comparing the overall performance of each group in the results of the neurodevelopmental dimension, the control group has the lowest values. Therefore, it was found that the experimental group shows relevant differences as a group involved in the Neuro Playground training.

Comparing Pedregal as a control group with the experimental groups, this one was characterized, in the pre-test, with better socioemotional characteristics than Rionegro. However, the Neuro Playground experience and other features of the educational and maturational process led to significant improvements in this dimension for Rionegro, where more than 50% of the group scored achieved in the socioemotional dimension.

A general comparison shows that both the control and experimental groups had relevant mobilizations. The level of variability of the performances was lower in the post-test of the experimental group. This indicates that the application of the Neuro Playground program generates higher sensibility to collective learnings, and, in all cases, the children show progress, not only linked to their evolutionary stage, but also to systematic and intentional stimulation.

KINDERGARTEN

Comparison of pre-test and post-test results between experimental and control groups in kindergarten grade

A comparison between Rionegro and Pedregal shows an equally significant difference, but the magnitude of effect is higher in Rionegro. The latter showed a very favorable child development condition at the pre-test, which were clearly fostered by the Neuro Playground intervention. Bello was expected to outperform Pedregal in terms of effect size, however, the Neuro Playground program did not have a larger impact on Bello's kindergarten. This is corroborated by the effect size data, which was quite small, near zero.

The post-test suggests the revision of multiple factors that could have influenced the effect of each preschool, placing each group in particular conditions, not homogeneous or linear, as the pre-test showed.

When contrasting both performances —before and after— between the experimental and control groups, Pedregal's performance is highly remarkable, as it shows large magnitudes of effect in the motor, socioemotional and learning readiness dimensions. In other words, there are very significant advances in the children of the Comfama Pedregal preschool, without requiring interventions other than the daily ones of the Comfama preschool's educational model, children's community, family and neighborhood influences, and other influences of their own context.

Concerning the pre-test, when comparing the sum of neurodevelopment between Bello, Rionegro and Pedregal, the magnitude of effect was small with a tendency to zero. This indicates that the groups started in homogeneous conditions in terms of the level of performance achieved. On the other hand, in the post-test there are statistically significant differences with more marked values and with a large magnitude of effect and with higher effects in some dimensions than in others.

The magnitude of effect in the neurodevelopmental dimension of the experimental group during the pre-test was moderate because the condition of Rionegro was particular due to the fact that its potential was included in the results with the Bello center. Pedregal and Bello presented similar performances, the difference being marked by Rionegro, although all three are within the achieved level, but with differences in the deviations.

TRANSITIONAL KINDERGARTEN

Comparison of pre-test and post-test results in transitional kindergarten grade between experimental and control groups

The results of the transitional kindergarten grade present different characteristics from pre-kindergarten and kindergarten because the training in Neuro Playground did not complete the stipulated weeks because of multiple factors that affected the execution schedule of the research and the implementation of the training. Given these circumstances, the post-test assessment of the control group is not available. Therefore, in order to make visible some outstanding improvements, the performances were analyzed by comparing the group with their own processes.

When comparing the Bello and Rionegro centers, it can be affirmed that, although the training was not applied for the period of time suggested by The Family Hope Center, significant advances were found in the Rionegro center, which were much higher than the results of the Bello center. In the case of the motor, socioemotional and learning readiness dimensions, the effect size was large and, in the case of sensory, it was moderate. This means that, as time and educational experiences passed, the result was favorable for the closing of gaps between individuals belonging to the transitional kindergarten groups.

KINDERGARTEN: group with disabilities

Comparison of pre-test and post-test results between experimental and control groups in kindergarten grade of children with disabilities

The developmental dimensions with the largest effect sizes were the socioemotional, learning readiness and motor dimensions. This indicates a high performance in the trajectory between the pre-test and post-test. Meanwhile, the sensory dimension was very small, almost zero. On the other hand, in the neurodevelopmental dimension, it is indicated that there were changes that concentrate child development in the "in process" level towards the "achieved" level, which generates the challenge of accompanying the particularities of each child and seeking larger closures of the deviations with minimum and maximum values that are closer in the trajectory of child development.

Although the results in the sample of children with disabilities did not have an effect size similar to the other groups, mobilizations in performance were found.

FIRST GRADE

Comparison of pre-test and post-test results between experimental and control groups in first grade

For this grade, the assessment of development took place in three moments with periods of five months between them. The third moment is interesting, as it shows a meaningful change as a result of some adjustments made by Comfama in the implementation of the training. In addition, the exercise of comparing with themselves demonstrated an equitable practice according to the particularities of each child, based on his or her diagnosis.

Another quite relevant finding is the influence exerted by peers to push the group towards individual achievements that contribute to collective triumphs. Thus, both the institutional influence and the group dynamics of the school grade concerned are powerful effects on child development, without forgetting the impact of family environment.

FIRST GRADE: group with disabilities

Comparison of pre-test and post-test results between experimental and control groups in first grade of children with disabilities

In this group of children, it was possible to find very significant differences between the pre-test and intermediate results with respect to the post-test. This responds to the need to increase the support to families and teachers in the application of the training, in order to make this assistance more intentional and structured.

The dimensions in which larger mobilization was seen were the motor, learning readiness and socioemotional dimensions. On the other hand, the sensory dimension had a moderate effect.

It should be noted that variability was a factor that did not diminish considerably, that is, the phenomenon of collective learning that was evident in children of the same grade without disabilities did not occur in those who did have a diagnosis. This fact may be due to the need for more exposure time to Neuro Playground training.

Social surveys formulated by The Family Hope Center for parents and educators

Rionegro

Evaluation of impact on parents and educators

In the comparison of the pre-test and post-test results, it was found an increase in the level of satisfaction of parents and educators about their own abilities to help children manage challenging behaviors and to respond to their educational needs. The level of confidence and frustration management by adults also increased, which validate the assistance processes provided by the program; the training has a favorable effect not only on the children, but also on their families and educators.

Improvements are also notables in the perception of parents, other relatives and educators regarding personal characteristics, such as energy, attitude and health, which are important features in the basis of the Neuro Playground proposal.

In the item "level of expectation for the future", there was a decrease. However, this can be explained by the fact that parents, other relatives and educators coincide in the increase in the level of the understanding of the children's learning processes and their degree of frustration. This implies that they feel stronger agency in the here and now and do not need to place their expectations on a future transformation.

Perception of children's development (by parents)

With regard to the survey *Impact on the quality of life and development of children*, the average response rate of parents was low, so the analysis was made with a sample of 25 people in the case of Rionegro and 11 in the case of Pedregal.

The answers given by the parents and other family members allow us to identify that in all cases a significant improvement in the development of the children and in their quality of life is recognized. Those performances related to following simple and complex instructions stand out, as well as those related to eye contact, mood and sleep quality, which showed improvements of 80%.

Regarding the item "sharing kindly", parents identified some improvement. This could be explained by the evolutionary moment corresponding to the age of the children, which is marked by egocentric thinking.

Letter and number recognition were also items in which some improvement was observed but did not equal the score of the other evaluated performances (70% showed some improvement).

Pedregal

Although this group did not participate in the training proposed by the Neuro Playground program, parents or other relatives identified a significant improvement in the children's development, both in the items related to quality of life, as well as in those related to their child development (language, reading, recognition). Relevant aspects such as: following instructions, with a 100% improvement, as well as those related to their mood, independence, health and eye contact also scored a high improvement.

Bello

In the case of the Bello preschool, 227 people participated in the survey *"Evaluation of impact on families and educators"* during the pre-test, including fathers, mothers, grandparents, uncles, and educators, while 147 people participated in the post-test for the same survey.

When comparing the pre-test and post-test of the mentioned survey, the following findings stand out, they are highly relevant and serve as indicators to determine the impact of the Neuro Playground training on parents and educators:

Truly relevant increase was observed in the perception of educators and families, between the pre-test and post-test, in the skills of assistance when facing challenging behaviors of the child.

The perception of parents and educators of excellent improvements in their levels of frustration towards the child increased.

The perception of excellent levels of understanding of the child increased from 33% to 75%.

CONCLUSIONS

The Neuro Playground experience, linked to the Comfama preschool educational model, shows a tendency towards a consistent change in the behavior of the groups. In other words, comparing child development before and after the intervention reveals a uniformity effect, with more advancements in some dimensions than in others, depending on the center. Furthermore, this effect tends to close gaps in development between individuals, a finding that can be interpreted from an equity perspective, within the framework of the key principles of the right to equity in education promoted by UNESCO. This would allow to consider educational interventions that reduce disparities, according to the characteristics of each site and each group.

After analyzing the assessment instrument proposed by The Family Hope Center and observing that it proposed items of child development in a range of 32 to 72 months, it was decided that an adaptation of the instrument was necessary, in order to evaluate children at the pre-kindergarten, kindergarten, transitional kindergarten and first grade levels, in a discriminate manner. It was also necessary to add the dimension "learning readiness" that was not included in the original instrument, since the national and Latin American assessment scales and the Comfama aspirational map considered elements that were not included in the table developed by The Family Hope Center and that were necessary in order to establish the level of impact of the Neuro Playground training on the development of children with and without disabilities.

The differences were more significant for the experimental group in the pre-test and post-test comparisons; likewise, the effect size was higher in the centers where the Neuro Playground training was implemented. This fact validates the hypothesis that, although there are specific developments to the evolutionary stage enhanced by the educational program of Comfama preschools, the systematic and intentional application of the Neuro Playground training has a positive effect on the neurodevelopment of the child and in a faster way.

After analyzing the results, it was found that the four developmental dimensions evaluated: motor, sensory, socioemotional, and learning readiness, revealed significant differences between the pre-test and post-test in the experimental and control groups. It should also be mentioned that there are more sensitive dimensions, as the specific case of socioemotional and learning readiness, which had higher magnitudes of effect. This shows that the motor and sensory dimensions need more time and intensity in the application in order to generate a higher effect size. It is worth noting that, when comparing the socioemotional performances of the control group with the experimental ones, there are relevant influences of Comfama's educational approach, that include practices such as yoga and *mindfulness*, which indicate prior dispositions to the intervention of the Neuro Playground program in the preschool children.

The six-month period between pre-test and post-test at Comfama Preschools presents a window of time in which the maturational calendar of child development indicates milestones that were fostered by active environments in the school and family system, aligned by the program itself. These conditions influenced the uniformity of the challenges posed for the children and, therefore, the impact on their child

development. However, the type of response that each grade group presented in the post-test depended on how each context assumed and responded to the intervention.

Continuing with this conclusive approach, it is recommended to Comfama to encourage opportunities for conversation, socialization, and discussion on how each center appropriate the Neuro Playground training. Its impact on teaching practice should also be considered, as it raises lessons about other ways of accompanying development since, in this pilot study, the Neuro Playground not only intervened and impacted the child development of the children participating, but also each actor in the process, whether family, teacher, coordinator, leader, administrator or others.

After the analysis of the pre-test and post-test evaluations applied to children with disabilities, who were part of the research sample, it became evident that the application of the Neuro Playground training produces large magnitudes of effect. This implies that there were significant advances in the performance of the children in the four dimensions evaluated, especially in the socioemotional dimension and in learning readiness. There was a lower impact in the sensory dimension, a finding that responds to the need for a longer application time of the program and the establishment of continuous training sessions, as well as a more direct assistance by the families for the exercises at home and the articulation with institutional activities.

In children with a diagnosis of disability, variability is maintained, that is to say that all of them improved in their performance in the different dimensions evaluated. However, there is no evidence of a collective learning as it was observed in children who do not have a diagnosis. It is observed that each one improves at his or her own pace and style, an aspect that may respond to the need to apply the Neuro Playground training for a longer period and to directly support families and teachers. Similarly, in the population with disabilities, a higher impact was seen in the motor, socioemotional and learning readiness dimensions, while sensory had a low magnitude of effect.

Finally, it is important to highlight as a very positive achievement that the Neuro Playground training proposed by the Family Hope Center is focused on actions with families. The experience developed by Comfama schools showed that institutional and collective work generates large effect sizes in the development of the four dimensions evaluated and that the direct assistance of educators, administrators and families favors systematic and articulated actions that result in important impacts of these institutions in the Antioquian society.

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