

# IMMEDIATE EFFECT ON MANUAL DEXTERITY IN A CHILD WITH DOWN SYNDROME PRE AND POST GAMETHERAPY SESSION: CASE REPORT

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## ABSTRACT

**Objective:** To analyze the immediate effect of gametherapy on the manual dexterity of a child with Down Syndrome in a single session. **Methodology:** The present study involves a 15-year-old child with Down Syndrome, selected according to the established inclusion criteria. Initially, screening will be carried out using an identification form, where all inclusion and exclusion criteria will be analyzed. Subsequently, the participant will undergo assessments at the Human Movement Analysis Laboratory (LAAMH) of UniEVANGÉLICA. **Results:** It is expected that the patient submitted to gametherapy will present superior results compared to the control group, reflected in the improvement of manual dexterity. **Conclusion:** This study demonstrates that gametherapy is a promising intervention for improving motor coordination and manual dexterity in children. The analyses revealed significant changes in the evaluated variables, confirming the effectiveness of the approach and suggesting its potential for integration into pediatric rehabilitation programs. These findings expand the knowledge on the use of innovative technologies in child rehabilitation but also establish a solid foundation for future investigations, aiming to optimize therapeutic care in pediatric populations.

**Keywords:** Children with Down Syndrome; Gameterapy; Reaching movement, Manual dexterity.

## INTRODUCTION

Down Syndrome (DS) is a condition of genetic origin characterized by a chromosomal abnormality that leads its carrier to present specific characteristics. It is recognized as the main cause of mental disability, being considered one of the most frequent numerical anomalies of autosomal chromosomes (FERREIRA, C. A. M.; RAMOS, M. I. B. 2007; RAMALHO, C. M.; PEDRE, M. R.; PERISSINOTO, J. 2000). In this population, we can observe a variability of deficits in the learning process and in development, directly impacting selective motor control, compromising motor acquisitions and the functional independence of its carrier (CARR, J. 2003; BOHNEN, I.; STRYDOM, A. 2012; BISSOTO, M. L. 2005).

Motor development presents some changes in the actions and patterns of movements that occur throughout life, which may be related to the age of each individual (RESTIFE, A. P. 2007). Functionality and functional performance in

children with DS is reduced when compared to the functionality of children who do not have this diagnosis, thus it is observed that hypotonia is present in 99% of cases, contributing to the fact that initial development is precarious due to a lack of descending impulses that command a set of motor neurons in the spinal cord (MANCINI, M. C.; SILVA, P. C.; GONÇALVES, S. C.; MARTINS, S. 2003).

Motor and cognitive limitations are not well described in the literature; however, a predominance of motor deficits is observed in the period corresponding to early childhood and a predominance of cognitive deficits in school age (GARCIAS, G. L.; ROTH, M. G. M.; MESKO, G. E.; BOFF, T. A. 1995). However, the magnitude of the differences in motor and cognitive performance of this population, compared to the typical development population, may not remain constant throughout development, thus characterizing itself as a hypothesis to be investigated (FEUERSTEIN, R. 1980).

This study analyzes the immediate effect of gametherapy on the manual dexterity of a child with Down Syndrome in a single session.

## **METHODOLOGY**

The present study complies with the Guidelines and Regulatory Norms for research with human beings, formulated by the National Health Council, according to Resolution 466/2012. The research was approved by the Ethics Committee of the Evangelical University of Goiás (UniEVANGÉLICA), under opinion number 5.628.137. The child's participation requires the consent of the guardians, obtained through the signing of the Free and Informed Consent Term. The child must also sign a Free Assent Term. The participant has the right to access all information and may withdraw at any time, without prejudice. The confidentiality and privacy of the data will be guaranteed. The study will be carried out at the Human Movement Analysis Laboratory of UniEVANGÉLICA, in partnership with the APAE of Anápolis and Casa da Joana.

The child was selected based on the following inclusion criteria: diagnosis of Down Syndrome, adequate understanding and cooperation, age of 15 years, impaired upper limb motor coordination. Exclusion criteria include: surgeries in the previous 12 months, orthopedic deformities with surgical indication,

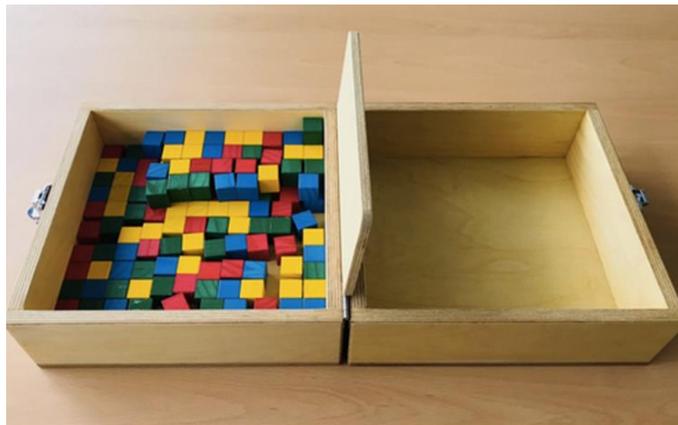
uncontrolled epilepsy, metallic implants in the skull or use of hearing aids, associated neurological disorders, and use of a pacemaker.

## RESULTS AND DISCUSSION

This study evaluated the effect of gametherapy on the three-dimensional movement analysis of the upper limbs and on the manual dexterity of a 15-year-old child, using the Box and Blocks Test scale. The assessment, with a maximum duration of 1 hour and 30 minutes, included the measurement of anthropometric data and a 20-minute intervention performed in a single session.

To evaluate and quantify the participant's gross manual dexterity, a test that measures time and resistance was applied. The participant was positioned in a chair adjusted to her height, with a box placed on a table to ensure full visibility (Figure 1). The test consisted of transporting small wooden cubes from one side of the box to the other for one minute. At the end, the number of blocks transported was recorded for both the dominant and non-dominant upper limbs, considering two attempts (CONNOLLY, B. H.; MICHAEL, B. T. 1986).).

**Figura 1:** Box and blocks test- Usada para avaliação funcional.



Before the gametherapy intervention, the participant underwent the Box and Blocks test, where she managed to transfer 25 blocks using the dominant hand and 27 blocks with the non-dominant hand, within a 1-minute interval. After a 20-minute gametherapy session, the same test was repeated. During the second assessment, an increase in the participant's performance was observed, as she managed to transfer 29 blocks with the dominant hand and 33 blocks with the non-dominant hand in the same period.

The discussion of the study revealed that the intervention with gametherapy resulted in an improvement in the manual dexterity of the 15-year-

old participant with Down Syndrome (DS), demonstrating an increase in the number of blocks transferred after a single 20-minute session. These findings are consistent with the literature, which highlights the motor difficulties in individuals with DS, such as hypotonia and joint hypermobility (Sharav & Bowman, 1992; Pitetti et al., 1992).

## **CONCLUSION**

The results obtained in this study indicate that gametherapy can be a promising intervention to improve the manual dexterity of children with Down Syndrome. The participant demonstrated a significant increase in the number of blocks transferred after just one 20-minute gametherapy session, suggesting that the use of playful activities focused on motor and cognitive skills can contribute to improved functional performance. Although this is a case study with a single participant, the data reinforce the importance of therapeutic interventions that combine cognitive and motor stimulation to promote functionality in children with DS. Future studies with larger samples and longer interventions are needed to validate the long-term effects of this approach.

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