

EFFECT OF ART THERAPY AND TASK-ORIENTED TRAINING IN IMPROVING QUALITY OF LIFE AND BALANCE IN CHILDREN WITH CEREBRAL PALSY: A PILOT STUDY.

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KEYWORDS

*Cerebral palsy,
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Abstract

Background:

Cerebral palsy (CP) is a non-progressive neurological condition that affects movement, posture, balance and overall quality of life in children. While traditional physiotherapy is commonly used as a primary treatment, alternative methods such as art therapy and task-oriented training have started to receive recognition for their potential to improve both motor skills and emotional health. However, the effects of these combined therapies have not been thoroughly investigated.

Objectives:

“The major objective of this study was to assess the effect of the combined approach of Art Therapy and Task-Oriented Training on balance quality of life improvement for children with cerebral palsy” and to compare the findings with improvements through conventional physiotherapy.

Methods:

A randomized controlled pilot study involved 22 children aged 6 to 13 years who were diagnosed with CP. “The participants were evenly divided into two groups: Group A was given Art Therapy along with Task-Oriented Training, while Group B received Conventional Physiotherapy. The interventions were conducted over a period of six weeks, with sessions held three times a week”. The Pediatric Balance Scale (PBS) and the Pediatric Quality of Life Inventory (PedsQL) were utilized to evaluate balance and quality of life, respectively, both before and after the intervention. Ethical approval was obtained, and participants provided informed consent.

Results:

Notable improvements in balance were observed within both groups, with the experimental group experiencing an increase in mean PBS scores from 32.14 ± 10.51 to 33.45 ± 10.23 ($t = -4.06$, $p = 0.0006$). However, when comparing the groups, no statistically significant difference was found “($t = 0.61$, $p = 0.5459$), suggesting that both types of therapy were similarly effective in enhancing balance. In terms of quality of life, the overall PedsQL score indicated a marginal improvement in the experimental group ($t = -1.98$, $p = 0.0607$), with emotional functioning approaching significance ($t = 1.89$, $p = 0.0734$). No significant changes were observed in physical ($p = 0.0856$), social ($p = 0.8623$), or school functioning ($p = 0.2012$). Correlation analysis showed moderate positive associations between balance improvements and physical ($r = 0.452$), school ($r = 0.463$), and social functioning ($r = 0.381$), while emotional functioning displayed minimal to no correlation with balance ($r = -0.058$).

Conclusion:

The combination of art therapy and task-oriented training led to significant improvements in balance for children with cerebral palsy, but it did not demonstrate superiority over conventional physiotherapy. Although there was a potential trend toward improvement in emotional well-being, the changes in overall quality of life were not statistically significant. These results indicate the necessity for longer-term treatment options and integrated psychosocial strategies to more effectively meet the emotional and functional requirements of children with CP.

INTRODUCTION

Imagine a world in which children with cerebral palsy are free to explore their environment, engage in their favorite pastimes, and experience the freedom that comes with being independence. A well-known neurodevelopmental disorder that begins in early childhood and lasts the entirety of a person's life is cerebral palsy (CP). Since being first recognized as "cerebral paresis" by Dr. William Little in 1861. (1) Cerebral palsy defines as a collection of motor and postural abnormalities that considerably restrict an individual's functionality, arising from non-progressive disturbance in the developing fetal or neonatal brain. Along with challenges with cognition, sensation, perception, communication, and/or behavior, CP causes motor impairments that can often associated with the presence or absence of seizure disorders. (1) The rate of prenatal/perinatal cerebral palsy during birth was 1.5 cases per 1000 live births in high-income nations (HICs). When considering post-neonatal cerebral palsy, this statistic increased to 1.6 per 1000 live births. Conversely, the birth prevalence of pre-/perinatal cerebral palsy was significantly higher in low- and middle-income countries (LMICs), reaching up to 3.4 per 1000 live births. (2) Etiology of cerebral palsy is complex and influenced by several factors during the prenatal and postnatal periods. (3) Preterm delivery and birth asphyxia were highlighted as the main causes of cerebral palsy in W. J. Little's early descriptions of the

condition in the 1840s. Over time, the understanding of the etiology of CP has been greatly influenced by this viewpoint. (4) Although asphyxia and preterm birth are significant, studies have revealed that the etiological factors are not entirely causative. Rather, they interact in complex ways, which makes it challenging to identify CP's preventable causes. (4) Various risk factors have been identified, such as complications during pregnancy, infections, and problem related to maternal health, which are associated with preconception and pregnancy factors. Neonatal infections and concerns like pre-eclampsia are examples of perinatal factors that have been associated with an increased risk for cerebral palsy. Multiple ventilatory risk factors (such as hypocapnia and hyperoxia) have been found to progressively increase the likelihood of cerebral palsy. (4)

The kinds of movement impairment that individuals with cerebral palsy most frequently display determines the categorization of the condition. (5) According to the traditional classifications, particularly those provided by Ingram in 1955 and Hagberg in 1976, CP can be classified into several clinical types. Ingram's classification provides a comprehensive insight into neurological disorders and their levels of severity, encompassing diplegia, hemiplegia, bilateral hemiplegia (tetraplegia), ataxia, dyskinesia, and various mixed forms.

Hagberg's classification further distinguishes between ataxia, spastic syndromes and extrapyramidal (dyskinetic) syndromes, emphasizing the variety of motor dysfunctions associated with CP. (5) In contrast, a more standardized classification system has been introduced by the Surveillance of Cerebral Palsy in Europe (SCPE), which simplifies the classification into three main groups: ataxic, dyskinetic (including dystonic or chore athetotic forms), and spastic (which can be unilateral or bilateral). The clinical practice benefits greatly from this classification as it makes it easier to identify the main symptoms that children with cerebral palsy experience. According to the SCPE guidelines, children with mixed conditions should be classified based on their most prominent symptoms. (5)

The clinical presentation of children with cerebral palsy has a variety of motor impairments that can significantly impact their day-to-day functioning. (6) "The most prevalent form of cerebral palsy, known as spastic CP, is marked by stiffness and difficulty in movement due to increased muscular tone". "This can show as either spastic hemiplegia, which affects only one side of the body, or spastic quadriplegia, which affects all four limbs and is often associated with serious brain traumas". Children with dyskinetic cerebral palsy have difficulty with posture and mobility due to involuntary movements and altered muscle tone. Decreased muscle tone, which leads to deficit and poor postural control, is a hallmark of

hypotonic cerebral palsy. (6) In addition to motor impairments children with cerebral palsy often experience visual abnormalities, cognitive impairments, and epilepsy. (6) The diagnosis and evaluation of children with cerebral palsy involve a thorough medical history and neurological examination. The main reason to seek medical attention is when a child is unable to meet motor milestones, which indicates a non-progressive motor deficiency and excludes degenerative disorders. (7) A comprehensive neurological examination is essential to verify that the motor impairments are caused by cerebral abnormality; this can require periodic evaluations for reliability. Additionally, screening for associated issues including mental retardation, hearing impairments, and speech difficulties is necessary during the initial evaluation since children with cerebral palsy frequently present with these conditions. Neuroimaging, especially MRI, is recommended to identify any irregularities in the brain that could assist in understanding the causes and prognosis of cerebral palsy. (7)

There are a variety of therapeutic interventions to improve the quality of life of children with cerebral palsy. (8) Conventional physical therapy involves a range of stretching, strengthening, and balance training designed to enhance the motor function, mobility, and overall quality of life in children with cerebral palsy. Depending on the child's particular type of cerebral palsy and motor function levels, these therapies

are customized to meet their specific needs. (9) However, as children get older, conventional physical therapy tends to be less effective. According to the study, older children improved at slower rates than younger children, indicating that the advantages of traditional therapy may diminish with age. (9) Also, the children with CP show less interest in doing intense exercises. Overall, the treatment of cerebral palsy is complex and requires ongoing research to identify the most effective strategies for improving outcomes in affected children. (10)

Art therapy is a therapeutic approach that enhances a person's mental, emotional, and physical health by utilizing the creative process. (11) Through art therapy, individuals with developmental disabilities can express themselves creatively and manage their emotions, building trust to meet their particular needs. (12) By giving the patient, a way to privately express herself through creating art, art therapy fosters the relationship between mental and physical wellness. the comprehensive character of art therapy, stating that it "supports patients' 'bio-psycho-social-spiritual' aspects in a holistic manner." (13) The main tasks in the art therapy protocol utilized are tracing figures to improve hand-eye coordination, coloring pictures to help children express their creativity and lower anxiety and drawing geometric shapes to foster creativity and improve fine motor skills. Additionally, printing flowers or vegetables gave children an enjoyable way to make original patterns

that encouraged self-expression and stimulated their senses. When combined, these activities helped children enhance their physical skills, creativity, and ability to relax. (14)

Task-oriented training (TOT) is a therapeutic technique that is based on motor control theory and employs exercises that mimic tasks to improve motor abilities. (15) Children with developmental disorders such spastic cerebral palsy (CP) benefits greatly from this approach, which has gained popularity since the early 1990s. (16) Task -oriented training activities include walking in different directions, navigating stairs or ramps, walking in obstacle courses, and engaging in balancing exercises. (17) Regardless of age or kind of CP, child-centered task-oriented training greatly improves a child's ability to balance and reduces the risk of falls. (18,19)

Several studies on art therapy have been preliminary, despite belief in its efficacy. They typically lack control groups and other rigorous methods needed to validate findings. The gap suggests that more thorough outcome studies and qualitative research will be needed to determine the actual effectiveness of art therapy. (20) while there is limited research on task-oriented training combined with other interventions.

Art therapy encourages self-expression and creativity while facilitating engagement, emotional control, and sensory integration. In contrast, task-oriented training makes use of repeated,

goal-oriented exercises to improve motor control, functional independence and coordination. Combining these methods might have a positive synergistic effect that enhance balance and general quality of life. However, there is limited research comparing the effectiveness of this combination strategy with traditional therapy for individuals with cerebral palsy.

NEED-

1. Children with cerebral palsy experience both motor and emotional challenges that are not fully addressed by conventional physiotherapy.
2. Limited research exists on the combined use of art therapy and task-oriented training to improve both balance and quality of life in this population.
3. This study explores an engaging, child-friendly intervention that integrates creativity with functional goals.
4. The findings aim to support the development of holistic rehabilitation strategies meet both physical and psychosocial needs.

Aim of the study: -

“To evaluate the effectiveness of a combined intervention of art therapy and task-oriented training in improving

balance and quality of life in children with cerebral palsy, and to compare its outcomes with conventional physiotherapy”.

METHODOLOGY

Sampling

The target population of the sampling technique is “the children who have been diagnosed with cerebral palsy”. “The sampling frame consisted of children between the ages of 6 and 13 years, leading to a final sample size of 22 participants”. “The participants were randomly separated into two equal groups: an experimental group and a control group”.

Sampling Technique

“A simple random sampling technique was used to recruit participants for the study. Eligible participants were selected from rehabilitation centers, special schools, local physiotherapy and pediatric clinics based on predefined criteria. Consent was obtained from the parents or guardians, and children were then assigned randomly to either the experimental group (Art Therapy + Task-Oriented Training) or the control group (Conventional Physiotherapy)”.

Study design

“A randomized controlled trial (RCT) with a pre-test and post-test design was used. The intervention took place over six weeks, with sessions scheduled three times a week. The study aimed to compare the effectiveness of the two interventions on balance and quality of life in children with CP”.

Inclusion criteria

- Age: 6- 13 years
- Gender: Both
- Children with cerebral palsy
- Having ability to follow basics instruction.

Exclusion criteria

- Severe cognitive impairment
- Completely dependent children
- Recent surgeries
- Severe medical history.

PROCEDURE

After explaining the participant about the research, informed consent was obtained from the parents or guardians of all participants. The study's objectives, methods, potential benefits and volunteer participations, were all thoroughly explained to ensure complete understanding. The parents and caregiver have enough time to ask any questions they might have before the study started. This study used a Randomized Parallel Group Active Control Trial design and was carried out

in Delhi NCR at several pediatric rehabilitation facilities and non-governmental organizations. Using convenience sampling, participants were chosen based on their ability to follow basic commands, be between the ages of 6 and 13, and have a cerebral palsy. Exclusion criteria included children having a major medical history, recent surgery, total reliance, or serious cognitive impairment. After enlisting 22 participants individuals were randomly assigned into two groups using basic randomization methods as a coin flip. Group A (the experimental group, consisting of 11 participants) was given task-oriented training and art therapy. Group B (Control Group; 11 participants): Received conventional physiotherapy. Over a period of six weeks, the study was carried out in three sessions per week, each lasting sixty minutes. Through planned movement-based and creative activities, the intervention aimed to improve balance and quality of life in children with cerebral palsy.

Intervention Protocol

Group A (Experimental Group: Art Therapy + Task-Oriented Training) Children in the experimental group participated in art therapy activities such as coloring, drawing, tracing figures, paper craft, thumb printing, and clay modelling, designed to improve fine motor skills, cognitive engagement, and emotional well-being. These activities encouraged creativity and participation, which played a role in enhancing their overall quality of life.

In addition to art therapy, task-oriented training included activities such as ball-throwing, target practices, obstacle crossing, reaching exercises, beads stringing and balance-focused tasks. These exercises were chosen specifically to enhance postural control, coordination, and functional mobility, helping children gain better stability and movement confidence in their daily activities.

Group B (Control Group: Conventional Physiotherapy) Children in the control group received conventional physiotherapy, which primarily focused on stretching, strengthening, and balance training. While these exercises aimed to improve motor function, they lacked the additional cognitive and creative engagement that art therapy and task-oriented training provided.

Assessments were conducted at two time points: before the intervention (Baseline, Day 0) and immediately after the six-week intervention period. The intervention's effectiveness was assessed using two standard tools. The

Pediatric Balance Scale (PBS) was used to measure balance and postural control. An increase in PBS scores following the intervention suggested better stability and movement control. To assess overall quality of life, the Pediatric Quality of Life Inventory (PedsQL) was utilized, considering the child's experience as well as parent input. Following the intervention, higher PedsQL scores indicated greater participation in everyday activities, improved emotional well-being, and an overall sense of satisfaction with life. All assessments were conducted properly through direct observation and caregiver input. Since children with CP may have varying levels of verbal communication, parental feedback was incorporated to ensure a comprehensive evaluation of their progress. Due to the combined effects of physical activity and creative engagement, it was expected that children in the experimental group would exhibit more improvements in balance and quality of life by the end of the study than the control group.



Fig (1) Art therapy activities.



Fig (2) Task – oriented training activities

Ethical issues

This research was conducted with approval from the ethical committee of the Department of Physiotherapy at Galgotias University, (DRC/PT/UG/24-25/041) adhering to the ethical standards outlined in the 1964 Helsinki Declaration and its subsequent amendments.

The personal information of participants, including their name, age, gender, contact number, and the rehab center they attend, was kept confidential and accessible only to the authors and the research guide.

Participation in this research was on a voluntary basis. Participants were not offered any monetary or nonmonetary rewards, and they had the option “to withdraw their participation any time without any explanation”.

Study was registered on CTRI at 04/11/2024. CTRI/2024/11/0776228.

Outcome Measures

- Sociodemographic Questionnaire
- Pediatric Balance Scale (PBS)
 - “The Pediatric Balance Scale was utilized to evaluate the balance and functional postural control of the child. It comprises 14 items, each assessed on a scale from 0 to 4, with the highest possible score being 56. Increased scores signify

improved balance performance. This instrument is both reliable and valid for assessing children with motor disabilities”.

- Pediatric Quality of Life Inventory (PedsQL)
 - “The PedsQL survey was employed to assess the quality of life in children. It encompasses areas such as physical, emotional, social, and school functioning. Each question is scored and transformed to a scale of 0–100, where higher scores indicate a better perceived quality of life”.

DATA ANALYSIS

Date Management

The data for this research were obtained through direct interaction with children who have cerebral palsy at various physiotherapy clinics, pediatric rehabilitation centers, and special school throughout Delhi NCR. Participants were chosen based on specific inclusion criteria after securing informed consent from their parents or guardians. A total of 22 children were evaluated and randomly assigned to two groups—Group A (Experimental) and Group B (Control). Information was gathered both before and after the 6-week intervention employing the

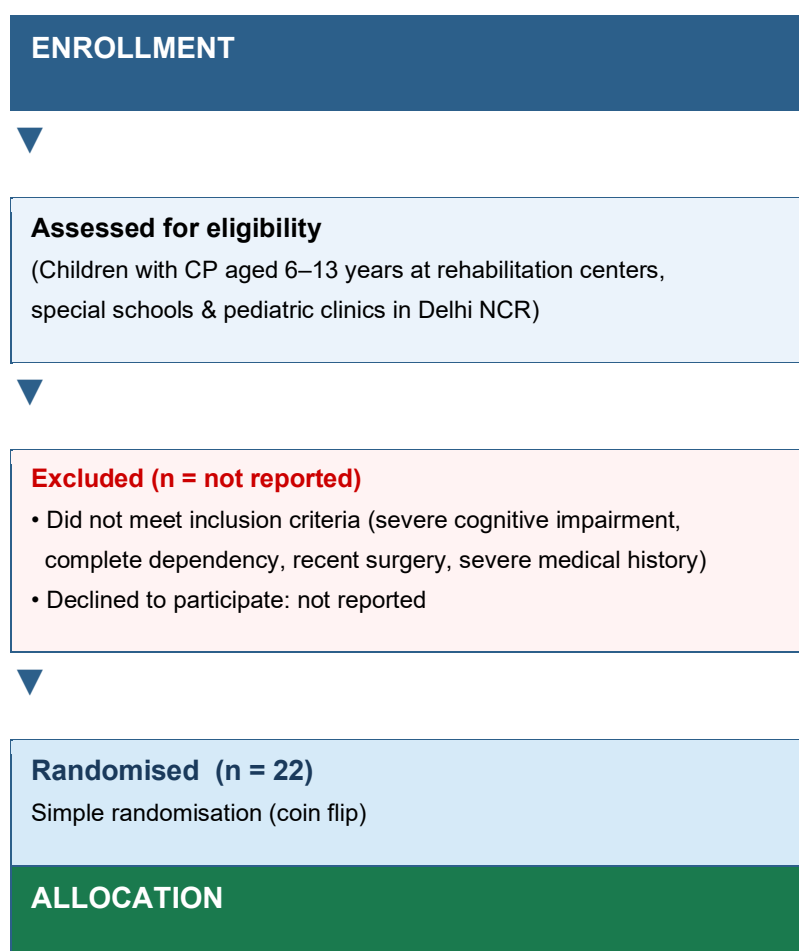
Pediatric Balance Scale (PBS) and Pediatric Quality of Life Inventory (PedsQL). All responses were documented manually and subsequently entered a master data sheet using Microsoft Excel.

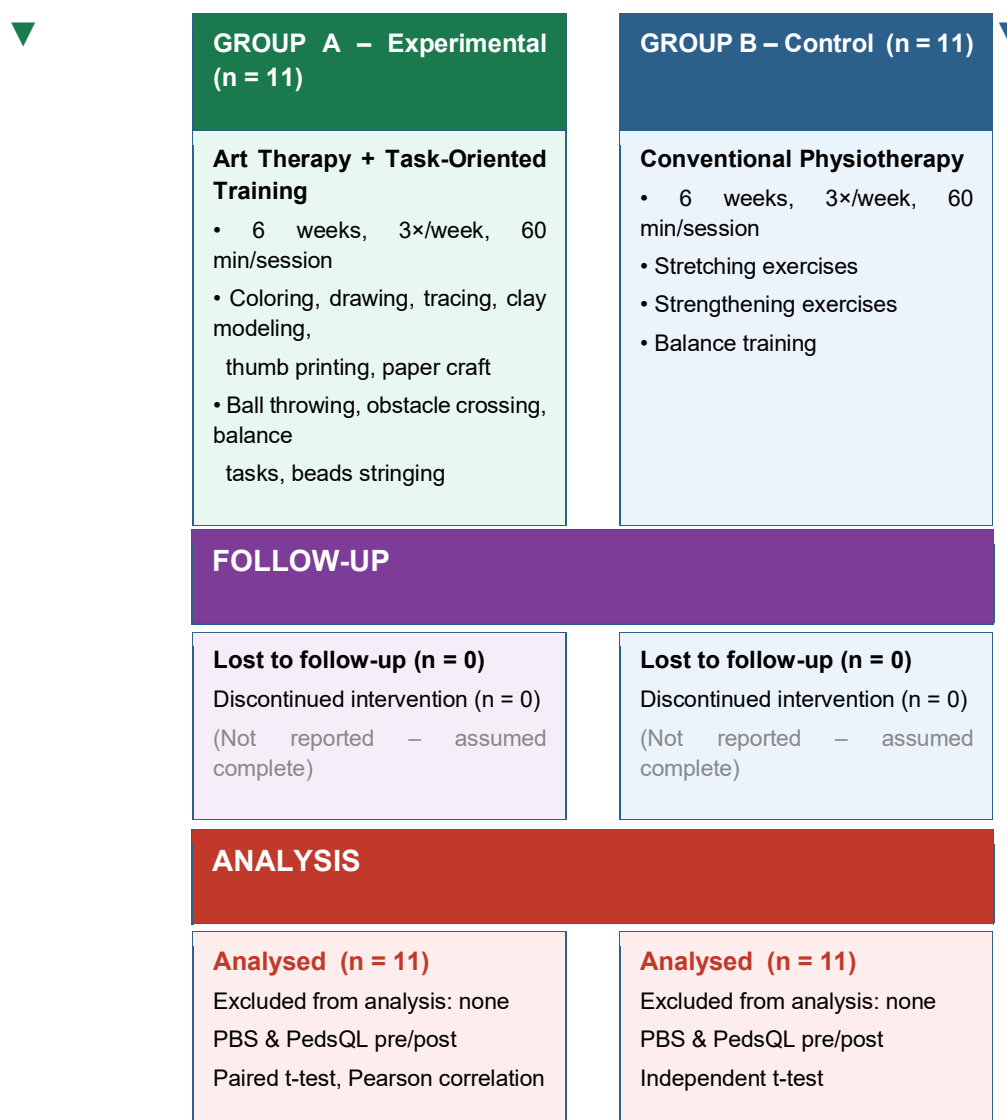
Data Analysis

The statistical analysis to meet the research objectives was conducted using SPSS version 20 software.

“Descriptive statistics were employed to summarize” the scores before and after the intervention. To assess differences within groups, paired t-tests were used, while independent t-tests compared outcomes between groups. Furthermore, bivariate correlations were analyzed using Pearson’s correlation coefficient to investigate the relationship between changes in balance and various domains of quality of life.

CONSORT 2010 Flow Diagram





RESULTS

Descriptive Statistics

Descriptive statistics were calculated for “the **Pediatric Balance Scale (PBS)** and **Pediatric Quality of Life Inventory (PedsQL)** scores for both **Experimental (Art Therapy + Task-Oriented Training)** and **Control (Conventional Physiotherapy)** groups.

Table 1 shows the within-group changes before and after the intervention.

Parameter	Group	Mean ± SD	Min	Max
PBS Pre	Experimental	32.14 ± 10.51	6	47
PBS Post	Experimental	33.45 ± 10.23	7	46

PBS Pre	Control	31.87 ± 9.98	5	45
PBS Post	Control	32.00 ± 9.82	6	44
PedsQL Pre	Experimental	36.02 ± 11.70	10.87	51.09
PedsQL Post	Experimental	37.29 ± 11.81	11.96	51.09
PedsQL Pre	Control	34.50 ± 11.02	12	50
PedsQL Post	Control	35.20 ± 11.10	13	50.5

Interpretation:

- **PBS (Balance Score):**

The experimental group showed a slight increase in balance scores post-intervention (**Mean: 32.14 → 33.45**), “whereas the control group showed **almost no change (Mean: 31.87 → 32.00)**”.

- **PedsQL (Quality of Life Score):**

“The experimental group showed” a moderate improvement (**Mean: 36.02 → 37.29**), while the control group showed only a minimal increase (**Mean: 34.50 → 35.20**).

Statistical Test Results

Paired t-tests (Within-Group Changes)

The results of the paired “t-tests conducted to assess within-group changes” indicate that there was a significant improvement in the PBS (Pediatric Balance Scale) Score

following the intervention ($t = -4.06$, $p = 0.0006$), suggesting that both therapies contributed to enhanced balance in “children with cerebral palsy”. However, physical functioning did not show a statistically significant change ($t = -1.80$, $p = 0.0856$), implying that the intervention may not have been sufficient to create a measurable difference in this domain.

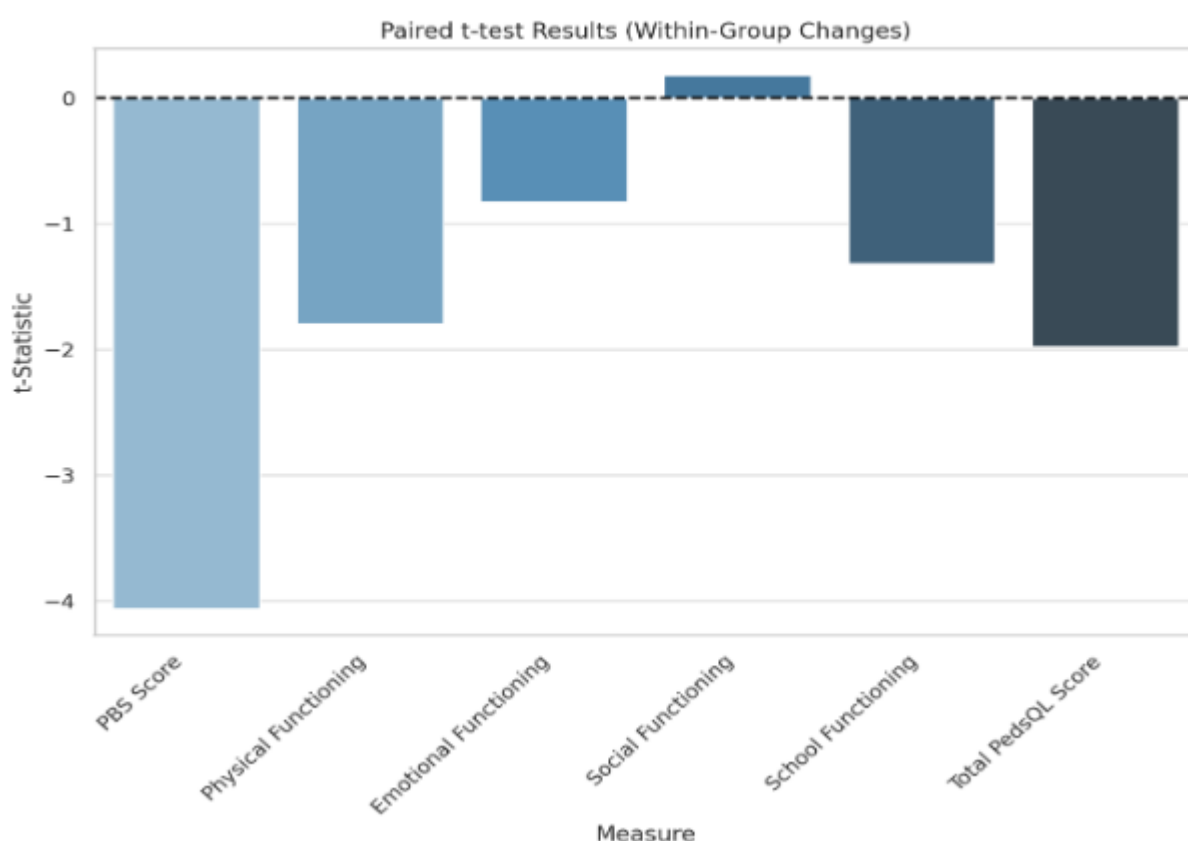
Similarly, emotional functioning remained unchanged ($t = -0.83$, $p = 0.4181$), along with social functioning, which showed no significant variation between pre- and post-intervention assessments ($t = 0.18$, $p = 0.8623$). Furthermore, school functioning also did not exhibit a meaningful improvement ($t = -1.32$, $p = 0.2012$). In contrast, the total PedsQL score demonstrated borderline significance ($t = -1.98$, $p = 0.0607$), suggesting a potential trend toward an overall enhancement in quality of life, though not strong enough to be statistically conclusive.

Table 2 presents the comparison between the experimental and control groups.

Measure	t-Statistic	p-Value
PBS Score	-4.06	0.0006
Physical Functioning	-1.8	0.0856
“Emotional Functioning”	-0.83	0.4181
“Social Functioning”	0.18	0.8623
“School Functioning”	-1.32	0.2012
Total PedsQL Score	-1.98	0.0607

“Table 1: Paired t-test Results (Within-Group Changes)”

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GRAPH 1

INTERPRETATION

shows the paired t-test results, where the PBS Score demonstrated a statistically significant improvement

(negative t-statistic). Other measures, such as physical, emotional, social, and

school functioning, did not show significant within-group changes.

Independent t-test Results (Between-Group Differences)

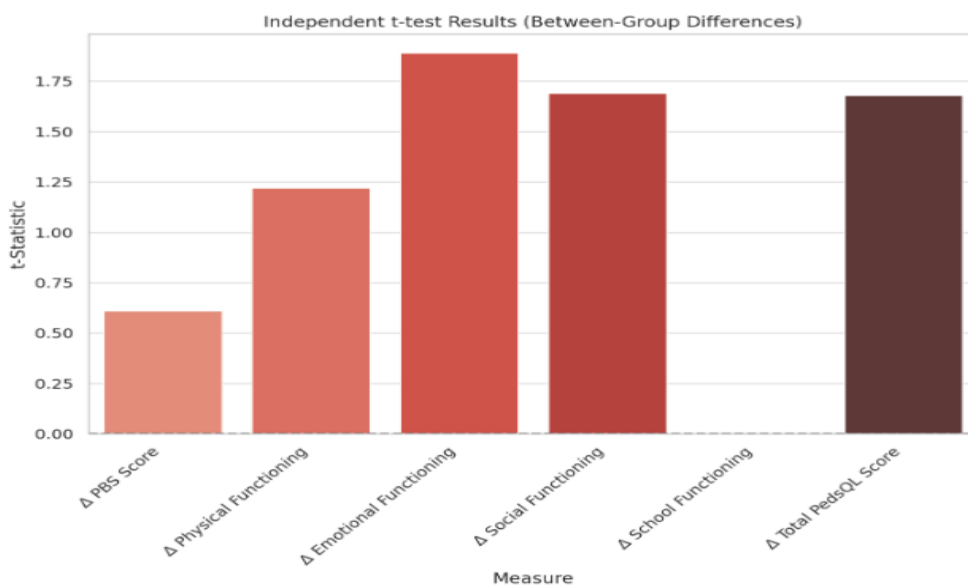
The **independent t-tests** comparing the differences between the experimental (art therapy + task-oriented training) and control (conventional physiotherapy) groups revealed **no significant differences across most outcome measures**. Specifically, “the change in PBS (balance) score did not significantly differ between groups ($t = 0.61$, $p = 0.5459$), indicating that both interventions were equally effective in improving balance. Similarly, **physical functioning did not show a meaningful difference** between groups ($t = 1.22$, $p = 0.2371$)”.

However, **emotional functioning demonstrated borderline significance** ($t = 1.89$, $p = 0.0734$), suggesting that the experimental intervention may have had a slight advantage in improving emotional well-being, though not strong enough to be statistically conclusive. In contrast, **social functioning exhibited no significant variation between groups** ($t = 1.69$, $p = 0.1070$), “and school functioning remained unchanged across both groups ($t = 0.00$, $p = 1.0000$)”. Lastly, “the total PedsQL score also did not show a significant difference between the experimental and control groups ($t = 1.68$, $p = 0.1087$)”.

Table 2 presents the comparison between the experimental and control groups.

Measure	t-Statistic	p-Value
Δ PBS Score	0.61	0.5459
Δ Physical Functioning	1.22	0.2371
Δ Emotional Functioning	1.89	0.0734
Δ Social Functioning	1.69	0.107
Δ School Functioning	0	1
Δ Total PedsQL Score	1.68	0.1087

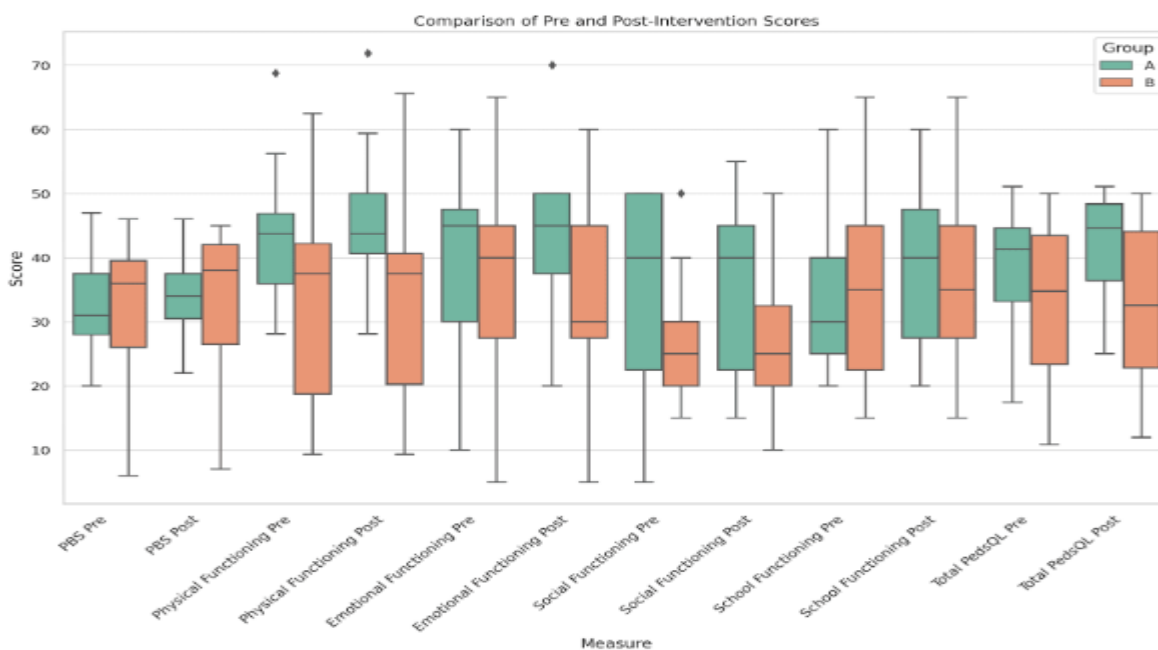
“Table 2: Independent t-test Results (Between-Group Differences)”



GRAPH 2

INTERPRETATION

independent t-test results between the experimental and control groups. No statistically significant difference was seen between groups; however, emotional functioning almost reached significance at 0.05.



GRAPH 3

Correlation Analysis Results:

The correlation analysis between **balance improvements (Δ PBS Score)** and **quality of life changes (Δ PedsQL Scores)** reveals the following key relationships:

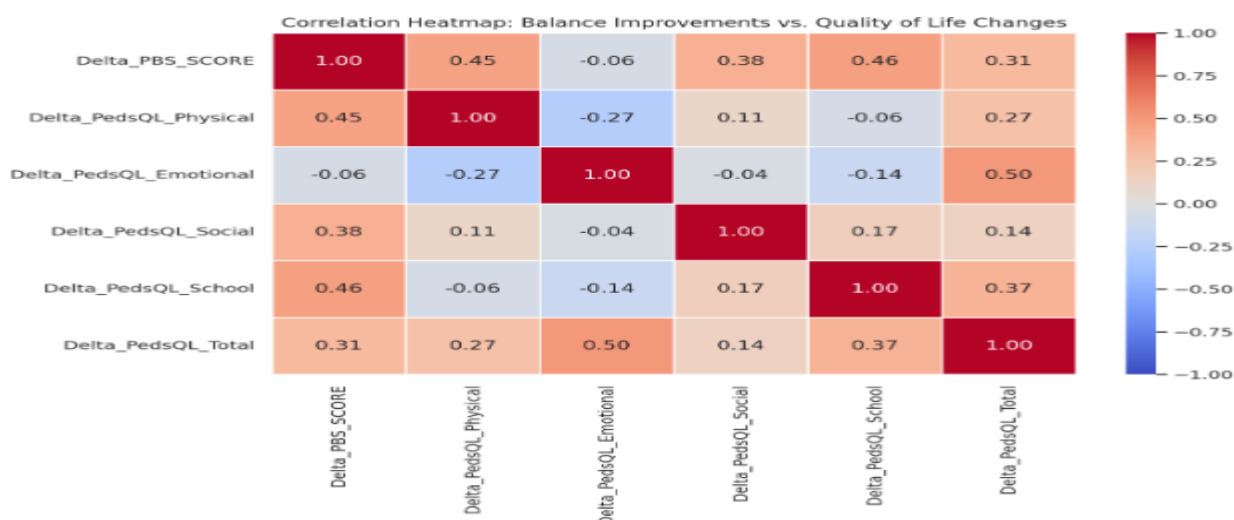
- **Balance improvement (Δ PBS Score)** shows a moderate positive correlation with **physical functioning ($r = 0.4522$)** and **school functioning ($r = 0.4633$)**, indicating that better balance is linked to slight improvements in these areas.
- **Total quality of life change (Δ PedsQL Total)** has a weak correlation with **balance improvement ($r = 0.3129$)**, suggesting that overall well-being is not strongly tied to changes in balance.
- **Emotional functioning (Δ PedsQL Emotional)** has a weak and negative correlation with **balance improvement ($r = -0.0583$)**, meaning emotional well-being changes were independent of balance improvements.
- **Social functioning (Δ PedsQL Social)** has a moderate correlation with **balance ($r = 0.3810$)**, implying that better balance might contribute slightly to improved social participation.
- **Total PedsQL change (Δ PedsQL Total)** is strongly correlated with **emotional functioning ($r = 0.5016$)**, indicating that emotional well-being is a key factor in overall quality of life improvements.

Table 3 highlights the relationship between balance improvements and PedsQL domains.

Measure	PBS Score	PedsQL Physical	PedsQL Emotional	PedsQL Social	PedsQL School	PedsQL Total
PBS Score	1	0.452	-0.058	0.381	0.463	0.313
PedsQL Physical	0.452	1	-0.266	0.107	-0.063	0.27
PedsQL Emotional	-0.058	-0.266	1	-0.043	-0.142	0.502
PedsQL Social	0.381	0.107	-0.043	1	0.168	0.141
PedsQL School	0.463	-0.063	-0.142	0.168	1	0.366

PedsQL Total	0.313	0.27	0.502	0.141	0.366	1
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Table 3: Correlation Between Balance and Quality of Life Changes



GRAPH 4

DISCUSSION

The present study aimed to investigate the effectiveness of a combined intervention—Art Therapy combined with Task-Oriented Training—in enhancing balance and quality of life for children with cerebral palsy and to compare these results with traditional physiotherapy.

The findings indicated a statistically significant enhancement in balance for both the experimental and control groups, as evaluated by the Pediatric Balance Scale (PBS)”. The experimental group experienced a mean

increase from 32.14 to 33.45 ($t = -4.06$, $p = 0.0006$). however, the comparison between groups showed no significant difference ($t = 0.61$, $p = 0.5459$), suggesting that both approaches were similarly effective in improving postural stability.

In terms of quality of life, as measured by the Pediatric Quality of Life Inventory (PedsQL), the total score for the experimental group displayed a marginal improvement ($t = -1.98$, $p = 0.0607$). However, the individual domains—including physical,

emotional, social, and school functioning—did not reveal significant changes. Notably, emotional functioning exhibited a nearly significant difference between the groups ($t = 1.89$, $p = 0.0734$), indicating a potential advantage of the combined intervention in fostering emotional well-being, although not conclusive.

Correlation analysis indicated moderate positive associations between balance improvement and physical ($r = 0.452$), school ($r = 0.463$), and social functioning ($r = 0.381$). These results imply that enhancements in balance may positively impact daily participation and functional activities for children with CP. In contrast, emotional functioning showed a weak negative correlation with balance ($r = -0.058$), indicating that emotional well-being might be affected by other factors outside of the scope of motor-focused therapies.

These findings align with previous literature suggesting that while physiotherapy and motor-based training are effective for physical outcomes, emotional and psychosocial components may require additional or targeted interventions. Art Therapy,

being a creative and expressive form of rehabilitation, may offer promise in these areas and should be further explored with longer intervention durations and larger sample sizes.

The results show that although both treatments significantly improved balance, the experimental and control groups did not differ significantly. Emotional functioning showed a marginal improvement, but other quality-of-life indicators did not reveal statistically significant improvements. Both therapies successfully improved balance in children with cerebral palsy (CP), as evidenced by the significant within-group improvement in Pediatric Balance Scale (PBS) scores ($t = -4.06$, $p = 0.0006$). The fact that there was no significant difference between the groups ($t = 0.61$, $p = 0.5459$) suggests that task-oriented training in combination with art therapy did not offer greater benefits above conventional physiotherapy. These findings align with previous research indicating that task-oriented training can enhance balance, but the added impact of creative therapies such as art therapy remains unclear. The pediatric quality of life outcomes measured by using pediatric quality of life inventory

shows a minimal improvement. While the total pedsQL score demonstrate a borderline significance ($t = -1.98$, $p = 0.0607$), subdomains such as physical, social, and school functioning did not show statistically significant changes. Emotional functioning showed a trend toward improvement ($t = 1.89$, $p = 0.0734$), suggesting that the experimental intervention may have contributed to psychological well-being. However, this effect was not strong enough to reach statistical significance. According to these findings, extra psychosocial interventions could be required to address the emotional and social “well-being of children with cerebral palsy”, even though motor-based therapy are essential.

These findings are supported by Karnadipa et al. (2024) (19), which emphasized the positive effects of specific task training on balance improvement in individuals with cerebral palsy, as measured by Berg Balance Scale (BBS). Its systematic review showed that although the methodological quality of the studies has been observed consistent and consistent improvements in various essays. The present study reflects this

evidence, as both groups (experimental and control) demonstrated statistically significant improvements in pediatric equilibrium scale (PBS) ($T = -4.06$, $p = 0.00006$) scores, affirming the role of task-specific motor interventions in increasing equilibrium skills.

Although equilibrium improvements were clear, improvements in emotional functioning remained boundary and not significant ($t = 1.89$, $p = 0.0734$). This observation resonates with Sant et al. (2024) (26), who found that creative modalities such as Doodle's art have significantly increased emotional and behavioral aspects in children with hemiplegic PC, particularly reflecting better sleep and emotional regulation. Although emotional gains in the present study have not achieved statistical significance, this trend suggests the psychological impact of creative interventions such as art-therapy can manifest more clearly with prolonged duration and personalized psychosocial support.

The potential influence of creative therapies on emotional and social domains was also explored by Lavric et al. (2023) (27), which reported that art therapy contributed to improved pro-

social behavior, reduced anxiety and improved empathy in children with neuro-psycomotor deficits. In current research, despite modest changes in emotional functioning and social welfare, correlation analysis showed a moderate association between balance and social participation ($r = 0.381$). These data suggest that motor improvements may indirectly promote social inclusion, which can be further amplified through structured creative outlets such as art -therapy.

Finally, aligning with Makris et al. (2021) (28) , who documented deficits in physical, psychological and social QV domains in children with PC, the current results highlight the multifaceted nature of rehabilitation. The modest improvement in the total score of Peds ql ($t = -1.98$, $p = 0.0607$) and moderate correlations with physical domains ($r = 0.452$), school ($r = 0.463$) and emotional ($r = 0.502$), reinforce the importance of comprehensive and interdisciplinary models. These results advocate integrative structures that include physical and expressive therapies to optimize results in pediatric neurorehabilitation.

CONCLUSION

In closing, it is worth reiterating the implications of the intricate nature of rehabilitation results in children diagnosed with cerebral palsy. Both experimental and control groups were found to be effective in the enhancement of balance. The borderline trends observed in emotional well-being and overall quality of life suggest that improvements in physical ability may not necessarily be accompanied by equally profound changes in all other areas of well-being.

The research emphasizes the necessity of going beyond conventional physiotherapy methods and incorporating creative, task-centered interventions such as art therapy to engage children in a manner that is both holistic and emotionally beneficial. Although not all quality-of-life aspects showed statistically significant enhancements, the trends observed suggest that these types of interventions could positively impact emotional and social growth when given sufficient time and consistency.

By framing these results within the larger context of pediatric neurorehabilitation, we acknowledge the intricate relationship between motor skills, emotional health, and everyday participation. Prior studies have demonstrated that factors such as engagement, motivation, and emotional wellness are crucial for effective rehabilitation in children, and this

research further supports that notion by exploring a more integrative method.

In the future, research should implement interdisciplinary models that merge motor, emotional, and cognitive therapies to improve both functionality and quality of life. Extending the duration of therapy, expanding the participant size, and including psychological support may provide deeper insights and more significant outcomes.

Ultimately, this research contributes important insights to the advancing field of pediatric rehabilitation, highlighting the necessity for inclusive, child-centered strategies that foster both physical and mental health. By recognizing the diverse needs of children with cerebral palsy and addressing them with engaging, comprehensive therapies, we progress toward enhancing not only their mobility but also their overall lives.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. The authors have no financial, personal, or

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