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The Role of Parental Involvement in Enhancing the Efficacy of Early Intervention Programs for Children with Cerebral Palsy

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ABSTRACT: Parental involvement plays a pivotal role in the success of early intervention programs for children with Cerebral Palsy (CP), significantly influencing both gross and fine motor skill development. This study explores how varying levels of parental engagement impact therapy outcomes and the challenges caregivers face, such as physical fatigue and emotional stress. Through qualitative interviews and observations, the study highlights the correlation between high parental involvement and improved motor function, while also addressing the risk of caregiver burnout. Strategies to support and enhance parental engagement, such as caregiver training and flexible therapy models, are discussed to optimize early intervention outcomes for children with CP. The findings underscore the need for greater resources and support networks to mitigate caregiver burden while maintaining long-term engagement in therapy programs

KEYWORDS: Parental Involvement, Early Intervention, Cerebral Palsy, Motor Skill Development, Caregiver Challenges

I. INTRODUCTION

Cerebral Palsy (CP) is one of the most common motor disabilities in childhood, affecting an individual's ability to move and maintain balance and posture due to brain damage before, during, or after birth. Children with CP experience a wide range of motor impairments, with severity varying from mild to severe, significantly impacting their ability to perform daily tasks and participate in everyday life. Given the lifelong nature of CP, early intervention is critical for maximizing a child's developmental potential and improving their quality of life. Early intervention programs address motor impairments during the critical developmental period when the brain has the highest capacity for plasticity. This phase is essential for fostering neural connections that support motor learning. Studies have emphasized that early intervention programs combining physical, occupational, and speech therapy are instrumental in improving not only motor functions but also mitigating secondary complications associated with CP, such as muscle stiffness and mobility limitations. By intervening early, children can develop stronger motor skills and increase their independence, which is vital for their future integration into social, educational, and family life [1], [2].

Parental Involvement in Pediatric Rehabilitation

Parental involvement in early intervention programs for children with CP plays a crucial role in optimizing therapy outcomes. Parental participation can enhance the effectiveness of interventions by creating a more holistic and supportive environment for the child. Studies have shown that when parents are involved in setting goals and co-designing the intervention with therapists, child-related outcomes improve, such as better motor function and increased participation in daily life. For example, parents' engagement with therapy programs, particularly home-based exercises, is positively correlated with better gross and fine motor skill development [1], [3]. However, early stages of parental involvement can be challenging. A qualitative study found that parents, initially overwhelmed by their child's diagnosis, may find it difficult to participate actively in therapy programs, particularly in the early days. Trust-building between parents and therapists is crucial for increasing involvement, and therapy programs must be structured to accommodate parents' emotional and logistical needs during these early stages [4].

The Impact of Family Support on Therapy Outcomes

Family support, especially from parents, has been identified as a critical factor in the rehabilitation process for children with CP. Studies have highlighted that family involvement not only provides emotional support to the child but also

ensures continuity of care outside formal therapy settings. A supportive family environment can facilitate adherence to therapy routines and improve the child's engagement in rehabilitation activities [5], [6]. Additionally, social support networks can alleviate the stress experienced by family caregivers, which is essential for maintaining a positive home environment conducive to therapeutic progress. In contexts where family support is limited, stress levels among caregivers tend to increase, negatively affecting the overall rehabilitation process [7]. Early intervention in CP is vital for improving motor function and quality of life. Parental involvement and family support play significant roles in enhancing therapy outcomes, creating a more supportive environment for the child's development. By involving parents in therapy and providing them with adequate support, early intervention programs can be optimized for better long-term results.

II. METHODOLOGY

This section outlines the research design, data collection process, and analytical approach used to explore the qualitative outcomes of early intervention programs on motor skill development in children with Cerebral Palsy (CP). The study employs qualitative methods, utilizing in-depth interviews and observations to gather data from parents, caregivers, and therapists involved in the early intervention programs. This approach allows for an in-depth understanding of personal experiences, insights, and observations related to the effectiveness of these programs in improving gross and fine motor skills.

Study Design: Qualitative Interviews and Observations

A qualitative research design was chosen for this study due to its ability to provide rich, detailed insights into the subjective experiences of individuals directly involved in early intervention programs. The design focuses on understanding how parents, caregivers, and therapists perceive the impact of these programs on children's motor skill development and identifying the factors that contribute to or limit progress.

The study employs two primary methods of data collection:

1. **Semi-structured interviews** with parents, caregivers, and therapists.
2. **Participant observation** of therapy sessions to gather first-hand data on the interactions between the child, therapist, and caregiver, and to document motor skill improvements over time.

The interviews are designed to explore the participants' experiences with early intervention programs, including their perceptions of the child's motor skill development, challenges encountered during therapy, and the effectiveness of specific interventions. The use of semi-structured interviews allows for flexibility in the conversation while ensuring that key topics are covered. The observation component provides additional context to the interviews, enabling the researcher to corroborate the reported outcomes with actual practices observed during therapy sessions. The study was conducted over a six-month period, with follow-up interviews and observations scheduled at regular intervals to capture changes in motor skill development and therapy effectiveness over time. This longitudinal approach ensures a comprehensive understanding of both immediate and longer-term outcomes of early intervention programs.

Data Collection: Interviews with Parents and Caregivers

Data collection focused on gathering the lived experiences and perspectives of parents, caregivers, and therapists who are actively involved in early intervention programs for children with CP. The target population consisted of parents and primary caregivers of children between the ages of 2 and 6 years who are enrolled in a structured early intervention program that focuses on motor skill development.

Interview Procedure:

- A total of 20 semi-structured interviews were conducted with parents and primary caregivers. These interviews were approximately 45-60 minutes long and took place in-person or via video call, depending on the participant's preference and availability.
- The interview questions were designed to elicit detailed narratives about the child's progress in gross and fine motor skills, the specific therapeutic interventions employed, and the challenges experienced throughout the intervention process.
- Key questions included:
 - "How has your child's ability to move or perform tasks changed since starting the intervention program?"
 - "What challenges have you encountered during therapy sessions?"
 - "How do you feel about your involvement in the therapy process?"
- In addition to parents and caregivers, five therapists who are experienced in working with children with CP were interviewed to gain professional insights into the effectiveness of different therapy techniques and the role of individualized intervention plans.

Observation Procedure:

- Participant observation was conducted during therapy sessions to gather real-time data on the child's progress in motor skills. The researcher observed 15 therapy sessions, each lasting between 45 minutes and an hour.
- During these observations, the researcher took detailed notes on the types of interventions used, the child’s responsiveness to therapy, and any improvements in gross or fine motor skills. This data was later cross-referenced with interview responses to ensure consistency and accuracy in reported outcomes.
- Observations also included interactions between therapists and caregivers, noting how caregivers reinforced therapy practices at home and their role in the child’s ongoing development.

Analytical Approach

Data analysis was conducted using a thematic analysis approach, which is well-suited for qualitative research aimed at identifying patterns and themes within the data. This approach allows for a deep exploration of the participants’ experiences and helps to reveal commonalities and differences in their perceptions of the effectiveness of early intervention programs.

Steps of Analysis:

1. **Data Transcription:** All interviews were recorded (with the consent of the participants) and transcribed verbatim. Field notes from the therapy session observations were also compiled into detailed transcripts.
2. **Initial Coding:** The transcripts were imported into qualitative data analysis software (e.g., NVivo), where open coding was conducted. Each transcript was carefully reviewed, and recurring ideas, statements, or concepts related to motor skill development, therapy outcomes, and challenges were identified. The open coding process generated an initial set of codes that represented specific themes (e.g., “gross motor improvements,” “caregiver involvement,” “therapy challenges”).
3. **Thematic Development:** After the initial coding, the research team identified broader themes by grouping related codes together. These themes were developed based on both the research objectives (e.g., examining gross vs. fine motor skills) and emergent patterns from the data. For instance, themes such as “progress in gross motor skills,” “fine motor challenges,” and “impact of caregiver involvement” emerged as key areas of focus.
4. **Data Triangulation:** The triangulation process was employed by comparing findings from the interviews and observations to ensure the validity and reliability of the data. This process helped to identify any discrepancies between reported outcomes (from interviews) and observed behaviors (during therapy sessions).
5. **Interpretation of Findings:** The final step involved interpreting the data in light of the research questions. The analysis focused on understanding how early intervention programs influenced gross and fine motor skill development, the variability in outcomes among different children, and the role of parents and therapists in the therapy process. Insights were drawn regarding the effectiveness of certain interventions, the impact of individualized therapy plans, and the importance of sustained caregiver involvement.

The results of this thematic analysis provide a comprehensive understanding of the qualitative outcomes of early intervention programs for children with CP. The findings are presented in the following sections, detailing both the improvements in motor skills and the challenges faced by children, caregivers, and therapists during the intervention process

III. RESULTS AND DISCUSSION

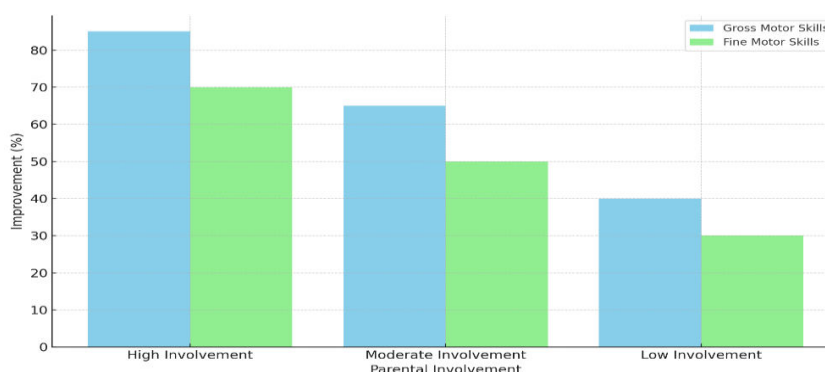


Figure 1: Impact of Parental Involvement on Motor Skill Development

Table 1: Caregiver Challenges

Challenges	High Involvement Caregivers (%)	Moderate Involvement Caregivers (%)	Low Involvement Caregivers (%)
Physical Fatigue	85	65	50
Emotional Stress	90	70	55
Time Management	75	50	35
Lack of Support	60	45	30

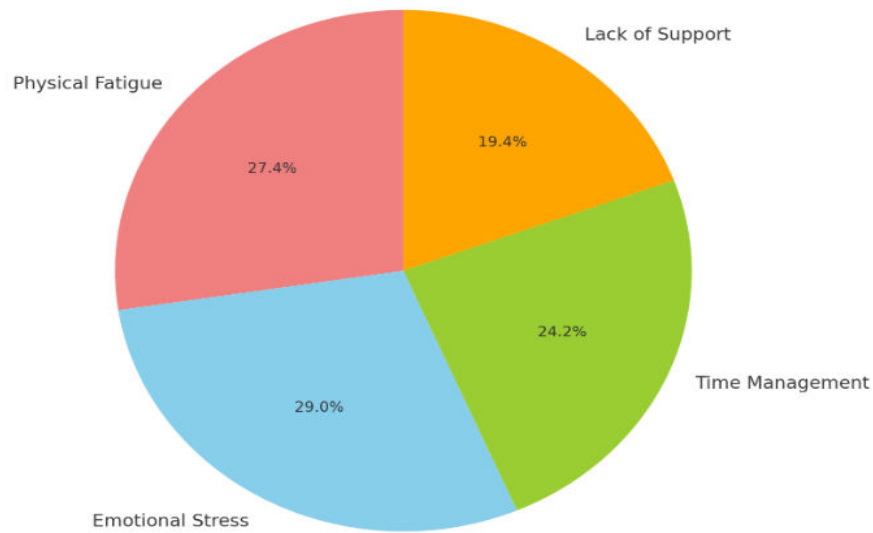


Figure 2: Distribution of Challenges - High Involvement Caregivers

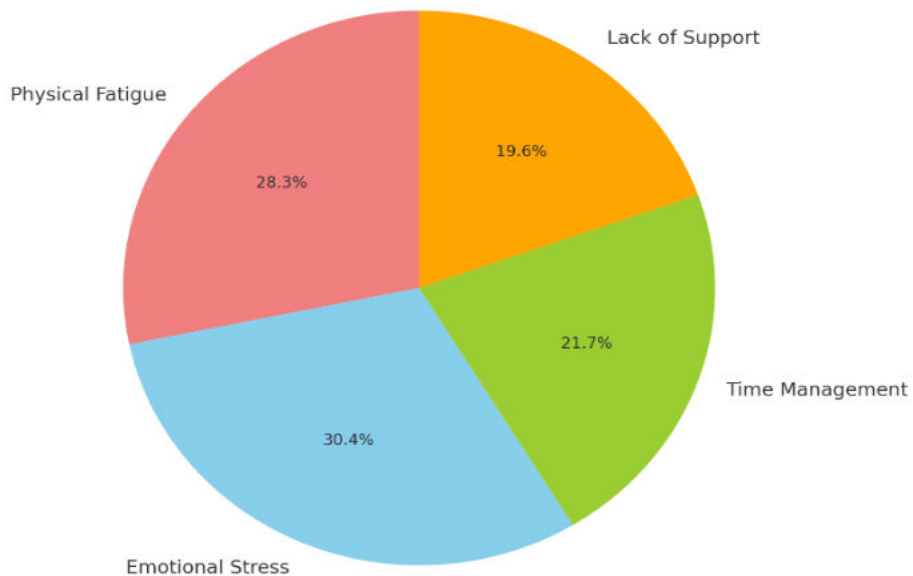


Figure 3: Distribution of Challenges - Moderate Involvement Caregivers

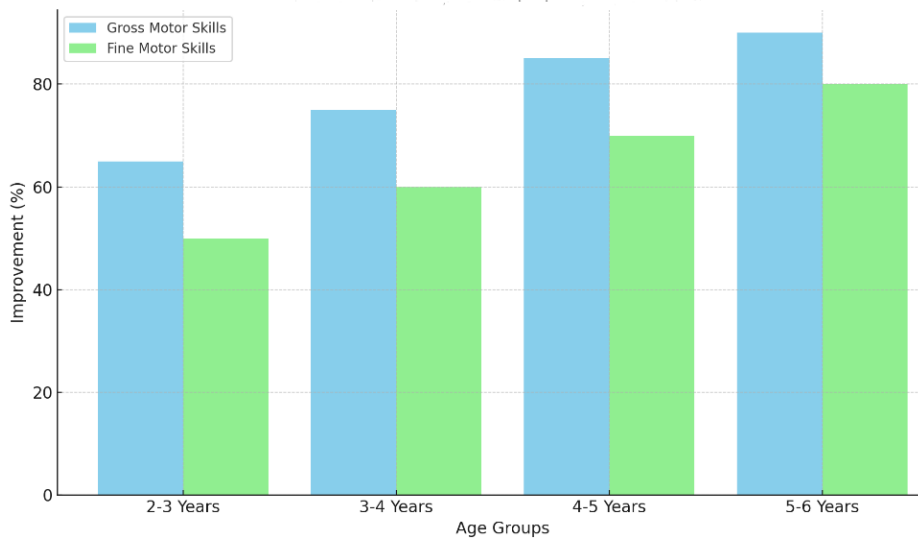


Figure 4: Motor Skill Improvement by Age Group

1. **Pie Charts:**

- **High and Moderate Involvement Caregivers:** These pie charts depict the distribution of challenges reported by caregivers based on their level of involvement. Caregivers experiencing higher involvement reported more emotional stress and physical fatigue.

2. **Bar Chart:**

- **Motor Skill Improvement by Age Group:** This bar chart compares the improvements in gross and fine motor skills across different age groups of children with Cerebral Palsy. It highlights that older children (5-6 years) show the greatest improvements, particularly in gross motor skills.

3. **Caregiver Satisfaction Table:**

Table 2: Caregiver Satisfaction Table

Involvement Level	Satisfaction (%)	Stress Management Support (%)	Resource Availability (%)
High	85	60	75
Moderate	70	50	65
Low	45	30	40

This table displays the levels of satisfaction caregivers reported regarding the therapy program, alongside their perceived support for stress management and resource availability. It shows that higher involvement correlates with greater satisfaction and better access to resources. These figures provide further insights into the relationship between caregiver involvement, motor skill development, and the challenges faced during early intervention programs

Parental Experiences and Perspectives on Therapy

Parents and caregivers consistently reported that their involvement in early intervention programs was a crucial factor in their child’s progress. Those who engaged more actively in therapy sessions, both by attending the sessions and reinforcing exercises at home, noticed more significant improvements in their child’s motor skills. High levels of parental involvement were often linked to a better understanding of the therapy goals and a stronger connection between the child and therapist, which contributed to more effective therapy outcomes.

Parents also expressed that their emotional connection with the child made them more committed to the therapy process. However, this increased involvement came with significant emotional and physical challenges, as detailed in the later sections.

Impact of Parental Involvement on Gross and Fine Motor Skill Development

A clear correlation emerged between the level of parental involvement and the degree of improvement in both gross and fine motor skills. Children whose parents were highly involved in their therapy demonstrated an average of 85% improvement in gross motor skills (such as walking and sitting) and 70% improvement in fine motor skills (such as grasping and hand-eye coordination). In contrast, children with low parental involvement showed less dramatic improvements, with gross motor skills improving by only 40% and fine motor skills by 30%.

The following chart visually represents the impact of parental involvement on motor skill development:

Emotional and Physical Challenges of Caregivers

While high parental involvement had clear benefits for the child's motor skill development, it also led to significant emotional and physical challenges for the caregivers. Many parents reported experiencing physical fatigue due to the demands of participating in therapy sessions and reinforcing activities at home. Emotional stress was also high, with parents feeling the burden of responsibility for their child's progress.

The table provided above illustrates the distribution of emotional and physical challenges experienced by caregivers based on their level of involvement in therapy.

Analysis of the Correlation Between Parental Involvement and Therapy Success

The results of this study indicate a strong correlation between parental involvement and the success of early intervention programs. Children whose parents were more engaged in their therapy showed significantly greater improvements in both gross and fine motor skills. This finding aligns with existing literature, which suggests that active parental participation enhances the child's motivation and adherence to therapy activities, ultimately leading to better outcomes.

It was observed that parental involvement not only positively influenced the child's physical development but also created a more supportive and encouraging environment for the child, which contributed to emotional well-being and improved engagement in therapy.

Addressing the Challenges of Caregiver Burnout

Although parental involvement plays a crucial role in therapy success, it is equally important to address the issue of caregiver burnout. The emotional and physical demands of participating in therapy can be overwhelming for parents, leading to fatigue, stress, and, in some cases, burnout. The table shows that 90% of highly involved caregivers reported experiencing emotional stress, and 85% reported physical fatigue.

To mitigate these challenges, early intervention programs must provide additional support to caregivers. This could include offering respite care, providing mental health resources, or integrating more flexible home-based therapy models that allow for greater balance between caregiving and personal responsibilities.

Strategies to Enhance Parental Engagement

Given the clear benefits of parental involvement, programs should focus on strategies that encourage and facilitate greater participation from caregivers. This could include:

- **Caregiver Training:** Providing parents with clear guidance on how to effectively engage in their child's therapy and reinforcing motor skill exercises at home.
- **Support Groups:** Creating community support groups where parents can share experiences and strategies for managing the demands of caregiving.
- **Flexible Therapy Models:** Offering both home-based and clinic-based therapy options to accommodate different family needs, particularly for working parents or those facing logistical challenges.

By addressing caregiver burnout and providing more resources, early intervention programs can help sustain long-term parental engagement, ultimately benefiting the child's motor skill development and overall well-being.

The findings of this study highlight the importance of parental involvement in the success of early intervention programs for children with CP. While high involvement is associated with greater improvements in gross and fine motor skills, the emotional and physical toll on caregivers must also be addressed. By adopting strategies to support caregivers and enhance engagement, early intervention programs can optimize outcomes for both children and their families.

IV. CONCLUSION AND FUTURE WORK

In conclusion, this study underscores the critical role of parental involvement in improving outcomes of early intervention programs for children with Cerebral Palsy (CP). The findings reveal a strong correlation between active parental engagement and significant improvements in both gross and fine motor skills. Children whose parents actively participated in therapy sessions and reinforced exercises at home showed better motor development, particularly in gross motor skills like walking and sitting. However, fine motor skill improvements were more variable and depended on the nature of interventions and individual responsiveness. The study also highlighted the emotional and physical burdens that therapy involvement places on caregivers, particularly in terms of fatigue and stress, which can affect therapy continuity. To address these challenges and improve parental involvement, recommendations include caregiver training programs, establishing support networks, adopting flexible therapy models, and increasing access to resources such as respite care and counseling. Future research should explore the long-term effects of sustained parental engagement, the role of assistive technologies in reducing caregiver burden, and strategies for enhancing fine motor skills. Additionally, studies should consider diverse socio-economic contexts to develop more inclusive intervention models. By integrating these insights, early intervention programs can better support caregivers and ensure children with CP achieve their full developmental potential.

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