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# The Impact of Gross Motor Stimulation Home Program on Family Empowerment and its Relationship with Functional Performance in Children with Cerebral Palsy

Linda Harumi[1]; Prasaja[2]

[1,2] Lecturer and Researcher Department of Occupational Therapy
Poltekkes Kemenkes Surakarta, Indonesia

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**Abstract:**

- ***Background:***

**Cerebral palsy (CP) is a lifelong condition of physical disability, a common complaint is the limitation of movement, posture, and coordination of movement. This condition impacts the child's ability to perform independent activities of daily living (ADLs), such as eating, dressing, toileting, and mobility, which has an impact on welbeing. In environmental situations that are difficult to access therapy and the lack of therapists causes the continuity of therapy to be hampered. The solution to overcome this situation is to optimize the family to stimulate child development. The results of many studies illustrate the effectiveness of family empowerment through structured home-based programs that primarily greatly increase family confidence and capacity to handle children and have a positive impact on the functional ability of children to carry out daily care effectively.**

- ***Objectives*:**

**The purpose of this study was to measure the effectiveness of a structured home program on the level of family empowerment, gross motor function, and ADL independence in children with cerebral palsy.**

- ***Methods:***

**This study used a one-group pretest-posttest pre-experimental design involving 32 children with CP and their caregivers in Sukoharjo District, Central Java, Indonesia. The participants received a two-month structured gross motor stimulation program at home in the form of a gross motor handling guide module for children with CP at home, where, before use, an explanation of the use of the module was carried out so that the implementation of the home program was appropriate, and in its implementation, regular monitoring was carried out through monitoring sheets and WhatsApp groups to ensure that the home program was consistent. The instruments used in this study include the Family Empowerment Scale, Gross Motor Function Measure (GMFM-88), and Wee Functional Independence Measure (WeeFIM). Data were analyzed using the Wilcoxon Signed-Rank test and linear regression.**

- ***Conclusion:***

**The results showed significant improvements in family empowerment ($p = 0.000$), gross motor function ($p = 0.042$), and ADL independence ($p = 0.013$) after the intervention. A strong positive relationship was found between gross motor function and ADL independence ($R = 0.624$; $R^2 = 0.390$; $p = 0.000$), proving that improved motor ability significantly contributed to improved independence.**

***Keywords:*** *Family Empowerment; Cerebral Palsy; Gross Motor Function; ADL Independence; Home-Program Intervention.*

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## I. INTRODUCTION

Cerebral palsy (CP), characterized by non-progressive disturbances in movement and posture due to brain damage occurring during pregnancy, childbirth, or shortly after birth [1], results in motor impairments that limit children's ability to perform essential activities of daily living (ADLs)—activities that are crucial for independence, participation, and overall quality of life [2].

In recent years, numerous studies have emphasized the critical role of family-centered care and home-based interventions. These approaches have been shown to increase adherence to intervention programs, improve children's functional outcomes, and reduce caregiver stress and burden [3][4]. Structured home programs—carried out frequently and meaningfully by caregivers in the child's natural environment—are aligned with the principles of neuroplasticity and present a promising strategy in pediatric rehabilitation [5].

Research by [6] and [7] has highlighted that early family-involved motor interventions, especially those focusing on postural control and mobility, can

significantly improve Gross Motor Function Measure (GMFM) scores and overall functional performance. These findings support the approach taken in this study, in which gross motor stimulation delivered through a structured home program has demonstrated significant benefits in children's motor development.

Additionally, the literature supports a strong positive relationship between gross motor abilities and independence in ADLs, commonly measured using the WeeFIM instrument. Such interventions can serve as practical solutions for children with special needs who often face limited access to formal therapy services [8]. Raising awareness and providing evidence of the effectiveness of such alternatives is crucial for broader community application, particularly in resource-limited settings.

Grounded in this context, the present study aims to investigate the effect of a Gross Motor Stimulation Home Program on family empowerment and to determine whether improvements in empowerment can contribute to enhanced gross motor function and ADL independence in children with CP. Furthermore, the study seeks to explore the direct relationship between gross motor function and daily living independence in children with cerebral palsy.

## II. MATERIALS AND METHOD

This study employed a pre-experimental one-group pretest–posttest design, complemented by a comparative cross-sectional analysis. The primary objective was to evaluate the effectiveness of a Gross Motor Stimulation Home Program in enhancing family empowerment. Additionally, the study aimed to examine the relationships between family empowerment, gross motor function, and independence in activities of daily living (ADLs) in children with cerebral palsy (CP).

A total of 32 children with CP and their families were selected using cluster sampling from three inclusive learning centers (Sanggar Inklusi) in Sukoharjo Regency, Central Java, Indonesia. Inclusion criteria required that at least one family member had completed secondary (high school) education.

The intervention consisted of a structured home program module designed to guide families in providing gross motor stimulation to their children. Prior to implementation, caregivers received training on how to use the module. The program was carried out at home over a two-month period and was regularly monitored through caregiver-completed activity logs. The intervention was intended to encourage active family participation and build their capacity to support the child's motor development.

Three standardized instruments were used to assess outcomes: the Gross Motor Function Measure (GMFM-88) to evaluate gross motor ability; the Wee Functional Independence Measure (WeeFIM) to assess independence in daily living activities; and a validated Family Empowerment Scale, which measured caregiver knowledge, attitudes, and capacity in supporting their child with CP. All instruments used in this study demonstrated strong validity and reliability.

Data analysis included paired t-tests or Wilcoxon signed-rank tests to compare pretest and posttest scores, depending on the normality of data distribution. The Pearson or Spearman correlation tests were used to assess the relationships between the home program, gross motor function, and ADL independence. All statistical analyses were conducted using SPSS software.

## III. RESULTS

This study provides some important insights into the effectiveness of home-based gross motor stimulation programs and the interrelationship between family empowerment, gross motor function, and independence in activities of daily living (ADLs) in children with cerebral palsy (CP).

### *A. Demographics of the Research Sample*

The demographic data of this research sample consisted of age, gender, and diagnosis of children with special needs. Description of the demographics data show in table 1.

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**Table 1: Sample Demographics**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Family Caregiver | Mother | 29 | 90.6 |
| | Father | 2 | 6.25 |
| | Grandfather | 1 | 3.13 |
| Family Age (years) | <30 | 1 | 3.13 |
| | 30–40 | 24 | 75.0 |
| | >40 | 7 | 21.87 |
| Family Occupation | Housewife | 21 | 65.6 |
| | Entrepreneur | 6 | 18.8 |
| | Laborer | 3 | 9.4 |
| | Domestic Helper | 1 | 3.1 |
| | Private Employee | 1 | 3.1 |
| Child's Age (years) | 3–5 | 10 | 31.25 |
| | 6–10 | 13 | 40.63 |
| | 11–15 | 9 | 28.13 |
| Child's Gender | Male | 15 | 46.9 |
| | Female | 17 | 53.1 |

Table 1 has showed that, the demographic characteristics of this research are most caregivers were mothers (90.6%) and predominantly aged between 30–40 years (75%). The majority of caregivers were housewives (65.6%). In terms of the children with cerebral palsy, most were between 6–10 years old (40.63%) and slightly more were female (53.1%) than male (46.9%).

*B. The Effect of Home Program Gross Motor Stimulation on Family Empowerment*

A wilcoxon Signed-Rank Test was conducted to determine the effect of the Home Program Gross Motor Stimulation on family empowerment. Table 2 present the result.

Table 2: The Effect of Home Program on Family Empowerment

| Family Empowerment_Post Family Empowerment_Pre | | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| Negative Ranks | a | 0 | - | - |
| Positive Ranks | b | 32 | 16.50 | 528.00 |
| Ties | c | 0 | - | - |
| **Total** | | 32 | | |

a. Posttest < Pretest
b. Posttest > Pretest
c. Posttest = Pretest

There was a consistent and significant improvement in family empowerment following the implementation of the gross motor stimulation home program. The absence of negative ranks or ties and the full presence of positive ranks (N = 32; mean rank = 16.50; sum of ranks = 528.00) strongly supports the effectiveness of the intervention in enhancing caregiver empowerment.

*C. The Effect of Home Program Gross Motor Stimulation on Gross Motor Function (GMFM)*

The Wilcoxon Signed-Rank Test was applied to make sure the effect of the intervention on gross motor function, Table 3 show the results.

**Table 3: Wilcoxon Signed-Rank Test Result for Gross Motor Function (GMFM)**

| Pre-Test Median | Post-Test Median | Z | p-value |
|---|---|---|---|
| 43.00 | 45.00 | -2.038 | 0.042 |

There was a statistically significant improvement in gross motor function (GMFM scores) after *Home Program Gross Motor Stimulation* intervention (Z = -2.038, p = 0.042).

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*D. The Effect of Home Program Gross Motor Stimulation on ADL Independence (WeeFIM)*

The Wilcoxon Signed-Rank Test was conducted to measure the impact of the intervention on children's ADL independence. The results is on Table 4.

**Table 4: Wilcoxon Signed-Rank Test Result for ADL Independence (WeeFIM)**

| Pre-Test Median | Post-Test Median | Z | p-value |
|---|---|---|---|
| 58.00 | 63.00 | -2.491 | 0.013 |

The statistic has showed the significant increase in ADL independence of children with cerebral palsy after intervention the gross motor stimulation home program ($Z = -2.491$, $p = 0.013$).

*E. The Relationship Between Gross Motor Function (GMFM) and ADL Independence After Intervention (WeeFIM)*

A linear regression analysis was performed to analysis whether gross motor function predicts ADL independence, . The output is summarized in Table 5.

Table 5: Linear Regression Between Gross Motor Function and ADL Independence

| Predictor | Outcome | R | $R^2$ | p-value |
|---|---|---|---|---|
| GMFM | WeeFIM | 0.624 | 0.390 | 0.000 |

A significant positive relationship was showed between gross motor function and ADL independence ($R = 0.624$; $R^2 = 0.390$; $p = 0.000$), indicate that better motor skills contribute substantially to daily functional independence. This reinforce the importance of gross motor stimulation as a key factor in enhancing the independence of children with CP in their everyday activities.

## IV. DISCUSSION

The results of this study highlight that a structured home-based gross motor stimulation program on family empowerment has an effect on the functional abilities of children with cerebral palsy. A family-centered and home-based approach to improving family empowerment after intervention can be an effective alternative in pediatric rehabilitation where there is limited access to therapy services [4]; [3]. Family empowerment builds the competence and confidence of caregivers to handle children with special needs in a natural environment and has a positive effect on children's development and independence [15].

The results of the measurement using GMFM reported significant results on gross motor function. This is consistent with the results of a randomized controlled trial in a recent study, which showed that motor training programs implemented by parents at home improved aspects of postural control, strength, and mobility in children with CP [7][6]. This is very positive and important because motor development has an effect on supporting children's capacity to complete daily tasks. [2]

Another result is that there was an increase in children's independence in daily life activities (WeeFIM score) after the intervention, which can be interpreted as the functional relevance of improving gross motor skills. ADL performance is the main indicator of children being able to participate in daily activities, and this improves the quality of life in children with disabilities. Providing a structured gross motor home program through routine family-based interventions can provide positive effects and be considered for continuous implementation [8] [9].

The data in this study did not follow a normal distribution, as indicated by the results of the Shapiro-Wilk test. This may occur in small sample sizes or heterogeneous clinical populations such as children with CP, where among them there are varying abilities based on the uniqueness of each case, such as in functional abilities, variations in the abilities of children with CP are influenced by age, severity, and comorbidities [5] [10]. Non-normal distribution requires this study to use non-parametric statistical tests, which are more conservative to reduce the possibility of detecting statistically significant differences [11].

Despite clinical improvements in GMFM and WeeFIM scores, the correlation between family empowerment on gross motor skills and resulting independence was not statistically significant. This may be due to several factors, including the relatively short duration of the intervention (two months), variations in caregiver compliance with program intensity, and differences in home care situations. This is in line with the results of other studies that were also conducted over short intervention periods and with diverse family structures [12]. These factors may reduce the measurable impact of caregiver empowerment on child outcomes over a limited period of time.

The research results obtained will be more optimal, stronger, and statistically significant by (1) extending the intervention time to provide a greater cumulative effect [6]; (2) intensive monitoring of caregiver compliance and skill retention [13]; and (3) grouping participants based on CP severity or age to control developmental variability [1]. The quantitative and qualitative mixed-method approach will produce qualitative feedback from families that can describe more comprehensive research results on family empowerment and its positive impact on gross motor skills and child independence [14].

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Linear regression analysis showed a strong and statistically significant relationship between gross motor function and ADL independence, with motor function accounting for 39% of the variance in functional independence. This finding confirms that motor competence strongly supports independence, as in previous studies [16] [1].

Overall, this study provides insight that the integration of structured home programs as a recommended care model provides positive effects and is appropriate for application to families of children in environments with limited health service resources. Other empirical results show that the effectiveness of family empowerment is obtained through training and guidance or structured monitoring.

## V. CONCLUSION

The conclusion is that a structured home gross motor stimulation program significantly helps increase family empowerment, confidence, and readiness in providing interventions for children with cerebral palsy at home. As a result, children experSience significant improvement in gross motor function and independence in activities of daily living (ADL). Although statistically significant correlations were found between family empowerment and children's functional outcomes, positive clinical findings suggest the possibility of an indirect effect: a strong and statistically significant relationship between gross motor function and ADL independence, which explained 39% of the variance in functional capacity. The use of non-parametric tests due to the non-normal distribution of data may have led to more conservative significance values, made possible by the small sample size. Overall, home program intervention involving families is effective in increasing family empowerment, gross motor function, and independence in children with cerebral palsy. Future research recommends longer intervention duration, larger sample size, and mixed quantitative and qualitative method approaches to strengthen the evidence of the effectiveness of this program in child rehabilitation.

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## REFERENCES

[1]. Novak, I., Morgan, C., Fahey, M., Finch-Edmondson, M., Galea, C., Hines, A., et al. (2020). Early, accurate diagnosis and early intervention in cerebral palsy: Advances in diagnosis and treatment. *JAMA Pediatrics*, 174(9), 897–903. https://doi.org/10.1001/jamapediatrics.2020.1683

[2]. Rosenbaum, P., & Gorter, J. W. (2021). The 'F-words' in childhood disability: A 2020 vision. *Developmental Medicine & Child Neurology*, 63(4), 369–374. https://doi.org/10.1111/dmcn.14708

[3]. Camden, C., Silva, M., Rivard, L., & Vaillancourt, T. (2020). Parent-delivered interventions for children with motor delays: A systematic review. *Physical & Occupational Therapy in Pediatrics*, 40(1), 1–21. https://doi.org/10.1080/01942638.2019.1642555

[4]. Araujo, J. P., Moreira, R. S., Magalhães, L. C., & Campos, T. F. (2022). Family-centered practices in pediatric rehabilitation: Evidence and implications for therapists. *Child: Care, Health and Development*, 48(4), 635–643. https://doi.org/10.1111/cch.12970

[5]. Morgan, C., Novak, I., & Badawi, N. (2021). Enriched environments and neuroplasticity in children with cerebral palsy: A narrative review. *Journal of Child Neurology*, 36(4), 270–277. https://doi.org/10.1177/0883073820982347

[6]. Pierce, J. L., Sheppard, L., & Miller, S. D. (2021). Relationship between family empowerment and gross motor function in infants and toddlers with cerebral palsy. *Pediatric Physical Therapy*, 33(1), 28–34. https://doi.org/10.1097/PEP.0000000000000747

[7]. Lee, H. Y., Kim, J. H., & Jung, D. W. (2023). Effects of a parent-implemented motor program on functional mobility in children with cerebral palsy: A randomized controlled trial. *Developmental Medicine & Child Neurology*, 65(3), 320–327. https://doi.org/10.1111/dmcn.15230

[8]. Mutlu, A., Gunel, M. K., & Kara, O. K. (2022). Relationship between Gross Motor Function Measure and Functional Independence in children with cerebral palsy. *Journal of Pediatric Rehabilitation Medicine*, 15(2), 115–122. https://doi.org/10.3233/PRM-220034

[9]. Effgen, S. K., & Chan, L. (2020). Motor performance and functional outcomes in children with cerebral palsy: Influence of physical therapy. *Pediatric Physical Therapy*, 32(2), 76–84. https://doi.org/10.1097/PEP.0000000000000662

[10]. Paneth, N., Hong, T., & Korzeniewski, S. (2020). The descriptive epidemiology of cerebral palsy. *Clinics in Perinatology*, 47(2), 205–221. https://doi.org/10.1016/j.clp.2020.02.001

[11]. Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, 10(2), 486–489. https://doi.org/10.5812/ijem.3505

[12]. Ketelaar, M., Vlek, D., & Gorter, J. W. (2021). Variability in response to early interventions for children with CP: Challenges in measuring outcomes. *Developmental Medicine & Child Neurology*, 63(6), 651–658. https://doi.org/10.1111/dmcn.14730

[13]. Dunst, C. J., Bruder, M. B., & Espe-Sherwindt, M. (2020). Family capacity-building practices in early childhood intervention. *Topics in Early Childhood Special Education*, 40(4), 224–236. https://doi.org/10.1177/0271121420916101

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25jun1420

[14]. D'Arrigo, R., Biamonte, F., Di Rosa, G., & Falsaperla, R. (2021). Family empowerment and outcomes in children with neurodevelopmental disabilities: A scoping review. *Italian Journal of Pediatrics*, 47, 226. https://doi.org/10.1186/s13052-021-01157-3

[15]. Bourke-Taylor, H., Law, M., Howie, L., & Pallant, J. F. (2021). Family quality of life following participation in occupational therapy home programs. *British Journal of Occupational Therapy*, 84(3), 171–180. https://doi.org/10.1177/0308022620955236

[16]. Palisano, R., Rosenbaum, P., Walter, S., Russell, D., Wood, E., & Galuppi, B. (1997). Development and reliability of a system to classify gross motor function in children with cerebral palsy. *Developmental Medicine & Child Neurology*, 39(4), 214–223. https://doi.org/10.1111/j.1469-8749.1997.tb07414.x