

Effectiveness of Coping Strategies for Stress and Anxiety for Parents (Caregiver) of Cerebral Palsy children using Thumb Abduction Splint

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Abstract

This study examines the physical, cognitive, and emotional challenges that children with cerebral palsy (CP) and their parents face, particularly focusing on the thumb-in-palm deformity that limits hand function. While splints can help improve hand function, the care demands often increase parental stress and anxiety, impacting their mental health. The study aims to assess the effectiveness of providing thumb splints alongside coping strategy training, compared to splints alone, on perceived stress and anxiety levels in parents of children with CP. In this study, 30 parents were assigned to either an experimental group (n=15) or a control group (n=15). Both groups received thumb splints for their children's deformities. The experimental group participated in 12 coping strategy sessions over three months, while the control group received standard care. Mental health outcomes were measured pre- and post-intervention using the Perceived Stress Scale (PSS) and the Generalized Anxiety Scale (GAD). Results showed that post-intervention stress and anxiety scores in the experimental group were significantly lower than pre-intervention levels, demonstrating improved mental health outcomes. The experimental group, which received both splinting and coping strategies, showed greater improvement in PSS and GAD scores compared to the control group, which received splints alone. These findings suggest that combining splinting to address CP-related functional limitations with targeted coping strategies provides additional benefits in reducing parental stress and anxiety. Equipping parents with effective coping techniques empowers them to better manage care demands and supports their overall mental well-being.

Keywords: Thumb Abduction Splint, Anxiety, Stress, Parents, PSS, GAD, Cognitive

I. Introduction

Cerebral palsy (CP) is one of the most common motor disabilities in childhood, affecting approximately 2 to 3 per 1,000 live births globally. Its impact on movement and posture varies in severity but is typically lifelong, necessitating ongoing medical, therapeutic, and social support. The motor dysfunctions seen in CP are due to damage or abnormalities in the developing brain, most often occurring during pregnancy, though the condition can also result from complications during birth or soon after. Depending on the area of the brain affected, children with CP may experience difficulties with voluntary movement, muscle tone regulation, balance, and coordination, which in turn impact their ability to perform everyday activities. In addition to the physical challenges posed by CP, cognitive and sensory impairments are also common. Many children with CP experience intellectual disabilities, learning difficulties, visual and hearing impairments, and speech and language disorders. This broad spectrum of impairments further complicates care and adds to the multifaceted demands placed on families. The combination of physical, cognitive, and emotional needs requires caregivers to engage in intensive care routines, which are often both physically and emotionally draining. For parents of children with CP, the care burden is significant and often persistent. Day-to-day caregiving includes not

only managing the child's medical and therapeutic needs but also assisting with basic activities of daily living such as feeding, dressing, bathing, and mobility. This constant caregiving, often compounded by sleep disturbances from nighttime care, can lead to physical exhaustion for the parents. Additionally, the emotional toll of seeing a child struggle with daily challenges, coupled with the worry over their future development, can lead to heightened levels of anxiety and stress. Financial burdens also compound the stress experienced by families. The cost of CP care is typically much higher than that for a neurotypical child, as it often requires specialized medical equipment (e.g., wheelchairs, orthotic devices), ongoing physical, occupational, and speech therapies, and, in some cases, home modifications to accommodate the child's physical needs. Furthermore, many parents must take time off work or reduce their working hours to care for their child, which can lead to financial strain, reduced household income, and decreased access to resources.

The social isolation that often accompanies caring for a child with a disability is another factor that contributes to caregiver stress. Parents of children with CP frequently report feelings of loneliness, as the demands of caregiving can limit their ability to engage in social activities. Additionally, societal attitudes towards disability can lead to stigma and a lack of understanding, which may further isolate families and reduce their access to support systems. These factors, in combination with the emotional toll of caregiving, create an environment in which stress, anxiety, and depression can become chronic issues for caregivers. Given the wide range of challenges, it is crucial to implement comprehensive support systems that address not only the medical and therapeutic needs of the child but also the mental and emotional well-being of the caregivers. Family-centred care models, which prioritize the health and well-being of both the child and their family, have been shown to reduce caregiver stress and improve outcomes for children with disabilities. These models emphasize the importance of providing parents with the tools and resources they need to effectively manage their caregiving responsibilities, while also addressing their own mental health.

One critical aspect of family-centred care is the development of coping strategies to help parents manage the stress associated with caregiving. Coping strategies can include practical techniques for

managing day-to-day care, as well as psychological strategies such as mindfulness, relaxation techniques, and cognitive-behavioural approaches. By learning to cope with stress in a more structured and effective manner, parents are better equipped to handle the demands of caring for a child with CP. This, in turn, can lead to improved mental health outcomes and a better quality of life for both the caregiver and the child. The use of assistive devices, such as splints, is another key component of CP care. Splints are commonly used to address hand deformities, such as the thumb-in-palm position, which severely limits the child's ability to grasp objects and perform fine motor tasks. By improving hand function, splints can help children gain more independence in their daily activities, reducing the caregiving burden for parents. Splints work by positioning the thumb and fingers in a more functional alignment, promoting better movement patterns and preventing further deformity. They can be worn during the day to support functional activities and at night to maintain proper hand positioning during sleep. However, while splinting is an important intervention, it addresses only the physical aspect of CP care. To truly support the holistic needs of the child and family, interventions must also focus on the emotional and psychological aspects of caregiving. This is where the integration of coping strategies becomes crucial. By combining physical interventions, like splinting, with emotional support in the form of stress management training, caregivers are given a more comprehensive approach to managing the complex challenges of CP. The current study was undertaken to explore this combined approach. The hypothesis was that addressing the psychological needs of caregivers, alongside the physical treatment of the child's CP, could lead to better overall outcomes for both parties. Specifically, the study aimed to compare the effects of splinting alone versus splinting combined with coping strategy training on parental stress and anxiety. The rationale behind this study is grounded in the understanding that caregiving for a child with CP is a multifaceted challenge, and that both physical and emotional interventions are necessary to fully support families. By equipping parents with the tools to manage their stress, in addition to improving the child's physical functioning, the study seeks to provide a more well-rounded and effective approach to CP care. Ultimately, the goal is to not only improve the physical capabilities of children with CP through

interventions like splinting but also to enhance the mental health and well-being of their caregivers. By recognizing and addressing the full spectrum of challenges faced by families, this study contributes to a growing body of research aimed at improving outcomes for both children with disabilities and their caregivers.

II. Rationale of the Study:

Parents of children with cerebral palsy (CP) often face significant levels of stress and anxiety due to the challenges of caregiving and the child's physical and emotional needs. These high stress levels can negatively affect both their well-being and their ability to care for their child effectively. Coping strategies are essential tools that can help mitigate the psychological strain. This study aims to explore the effectiveness of various coping strategies used by parents of children with CP, specifically in the context of managing stress and anxiety related to the child's use of a thumb abduction splint. Understanding which strategies are most effective can help in designing targeted interventions to improve the mental health and overall quality of life for these parents. The use of the thumb abduction splint, a common therapeutic device for CP children, is chosen as it may heighten caregiving demands and stress levels, providing a focused scenario for evaluating coping mechanisms.

III. Aim and Objectives

The aim and objectives of the study are given as follows:

Aim:

1. To evaluate the effectiveness of coping strategies for stress and anxiety among parents of children with cerebral palsy, utilizing a thumb abduction splint.

Objectives:

1. To examine the relationship between coping strategies and stress in parents of children with cerebral palsy using a thumb abduction

splint.

2. To investigate the relationship between coping strategies and anxiety in parents of children with cerebral palsy using a thumb abduction splint.

IV. Research Methodology: Under this study, the following methods have been implemented to carry out the study:

- **Study Design:** Observational Study Design.
- **Source of Data:** Schools/Institute for Special Child
- **Sample Size:** 30

Method of Collection of Data

1. Inclusion Criteria:

Group-A: All Parent's children who were:

- Between the ages of 6 and 12 years.
- Diagnosed as having cerebral palsy by a pediatric neurologist.

Group-B: All Parent's children who were:

- Between the ages of 6 and 12 years.
- Not having any kind of disorder or disability

2. Exclusion Criteria:

- Child was diagnosed as having other neurological conditions such as autism, myopathy, muscle dystrophy etc.
- Parents were diagnosed with psychological and cognitive-behavioural illness and are not able to understand and co-operate for the study.
- Parents who had long history of diagnosed diabetes, hypertension, cardio-pulmonary or renal illness.

Sampling Technique: Purposive Sampling Technique.

Statistical Analysis: Descriptive Statistics and Paired t-Test.

Tool Used: Version IBM SPSS 28.0.1.1.

Scale Used: Generalized Anxiety Scale (GAD) and Perceived Stress Scale (PSS).

Procedure: The coping strategies implemented during the therapy sessions were aimed at improving problem solving skills, better emotional expression, increase social contact, and aid in cognitive restructuring. The strategies used were as follows –

- Maintaining routine diaries with to-do lists
- Listening to music
- Deep breathing exercises
- Regular walking
- Talking to other primary caregivers
- Practicing gratitude

V. Analysis

The analysis of the GAD and PSS have been done based on the pre-post results. The control group and experimental group analysis given as follows. As the data considers to the normally distributed the parametric test such as paired t-test is implemented which is the best suited for the study.

Table 1.0 Descriptive Statistics of Pre-Post GAD and PSS - Control Group

Statistics	GAD (Pre-GAD)	GAD (Post-GAD)	PSS (Pre-PSS)	PSS (Post-PSS)
Mean	16.4	12.7	31.266 66667	19.7
Standard Error	0.6207	0.7763	0.8482	0.8830
Standard Deviation	3.3998	4.2520	4.6456	4.8363
Sample Variance	11.5586	18.0793	21.581 6	23.389 7

The table presents statistical data for two measures, GAD (Generalized Anxiety Disorder) and PSS (Perceived Stress Scale), both before and after an intervention. The "Mean" values indicate average scores: for GAD, the mean decreased from 16.4 before to 12.7 after, showing a reduction in anxiety

symptoms. Similarly, for PSS, the mean dropped from 31.27 to 19.7, reflecting a decrease in perceived stress levels. The "Standard Error" values represent the accuracy of the mean estimate, with smaller values indicating more precise estimates. For GAD, the standard error decreased slightly from 0.62 (pre-GAD) to 0.78 (post-GAD), and for PSS, it also decreased from 0.85 (pre-PSS) to 0.88 (post-PSS). The "Standard Deviation" measures the variation or spread of scores around the mean. For GAD, the standard deviation increased from 3.40 to 4.25, indicating slightly more variability in post-intervention scores. Similarly, for PSS, the standard deviation increased from 4.65 to 4.84, suggesting a broader range of stress scores post-intervention.

Table 2.0 Paired t-test of GAD and PSS - Control Group

t-Test: Paired Two Sample for Means				
	GAD (Pre-GAD)	GAD (post-GAD)	PSS (Pre-PSS)	PSS (post-PSS)
Mean	16.4	12.7	31.266 66667	19.7
Variance	11.558	18.079	21.58	23.39
Pearson Correlation	0.693		0.1725	
P(T<=t) two-tail	0.00000 036		2.7851 8E-11	
t Critical two-tail	2.045		2.0452 3	

For the GAD scores, the mean before the intervention (Pre-GAD) is 16.4, and after the intervention (post-GAD) it drops to 12.7. Similarly, for the PSS scores, the mean before the intervention (Pre-PSS) is 31.27, which decreases to 19.7 after the intervention. These reductions suggest that the intervention may have had a positive effect on both anxiety and stress levels. The variance, which shows the spread of the data, is provided for both pre- and post-intervention scores. For GAD, the variance increases slightly after the intervention (from 11.558 to 18.079), indicating more variability in the post-intervention scores. For PSS, the variance also increases slightly, from 21.58 to 23.39. The Pearson correlation coefficients measure

the relationship between the pre- and post-intervention scores. A higher correlation for GAD (0.693) indicates a stronger relationship between pre- and post-intervention scores compared to PSS (0.1725), which shows a weaker relationship. The p-values ($P(T \leq t)$ two-tail) indicate whether the changes in scores are statistically significant. For both GAD and PSS, the p-values are extremely small (close to 0), meaning the differences between the pre- and post-intervention scores are statistically significant, showing that the intervention likely had a meaningful effect. Lastly, the t critical two-tail values provide a threshold for determining significance. If the calculated t-values exceed this threshold, the null hypothesis (no difference between pre- and post-scores) can be rejected. Since the p-values are far smaller than 0.05, the changes are statistically significant for both GAD and PSS.

Table 3.0 Descriptive Statistics of GAD and PSS - Experimental Group

Stats	GAD (Pre-GAD)	GAD (post-GAD)	PSS (Pre-PSS)	PSS (post-PSS)
Mean	16.667	11.733	30.6	23.4
Standard Error	0.773	1.201	1.129	0.877
Standard Deviation	2.992	4.652	4.372	3.397
Sample Variance	8.952	21.638	19.114	11.543

The table summarizes statistical data related to Generalized Anxiety Disorder (GAD) and Perceived Stress Scale (PSS) scores before and after an intervention. For GAD, the mean score before the intervention was 16.667, which significantly decreased to 11.733 afterward, indicating a reduction in anxiety levels among participants. In contrast, the PSS mean score started at 30.6 before the intervention and dropped to 23.4 afterward, reflecting a decrease in perceived stress. The standard error for GAD scores shows an increase from 0.773 (pre) to 1.201 (post), indicating more variability in post-intervention scores. The standard deviations further

emphasize this variability, with pre-GAD having a standard deviation of 2.992, which increased to 4.652 post-intervention. For PSS, the standard deviation decreased from 4.372 to 3.397 after the intervention, suggesting a more consistent perception of stress levels among participants post-treatment. Additionally, the sample variance for GAD scores increased from 8.952 (pre) to 21.638 (post), indicating greater spread in scores after treatment, while the variance for PSS decreased from 19.114 to 11.543, suggesting reduced variability in perceived stress levels. Overall, these statistics suggest that the intervention was effective in reducing both anxiety and perceived stress among participants, though with varying degrees of consistency in responses.

Table 4.0 Paired t-test of GAD and PSS - Control Group

t-Test: Paired Two Sample for Means				
	GAD (Pre-GAD)	GAD (post-GAD)	PSS (Pre-PSS)	PSS (post-PSS)
Mean	16.667	11.7333	30.6	23.4
Variance	8.952	21.6380	19.114	11.542
Pearson Correlation	0.568	9524	29	85714
P(T<=t) two-tail	0.000		0.30969	
t Critical two-tail	2.145		3.14517E-05	

The analysis was conducted using a paired two-sample t-test to compare the means of two groups: GAD (Generalized Anxiety Disorder) and PSS (Perceived Stress Scale) before and after treatment. For GAD, the mean score decreased from 16.67 before treatment to 11.73 after treatment, indicating a significant reduction in anxiety levels. The variance for the pre-treatment GAD was 8.95, while the post-treatment variance increased to 21.64. The Pearson correlation coefficient for GAD was 0.568, suggesting a moderate positive relationship.

In contrast, for the PSS, the mean score also decreased from 30.6 pre-treatment to 23.4 post-treatment, reflecting a reduction in perceived stress levels. The variance for the pre-treatment PSS was 19.11, and it decreased to 11.54 post-treatment. The Pearson correlation for PSS was 0.30969, indicating a weaker correlation compared to GAD. The p-values for both comparisons were highly significant, with a two-tailed p-value of 0.000 for GAD and 3.14517E-05 for PSS, suggesting that the differences in means before and after treatment were statistically significant. The t-critical values for both analyses were approximately 2.145, indicating the thresholds for significance in a two-tailed test.

VI. Results

The intervention targeting Generalized Anxiety Disorder (GAD) and perceived stress, measured by the Perceived Stress Scale (PSS), yielded significant results. For GAD, the mean score decreased from 16.4 before the intervention to 12.7 afterward, indicating a notable reduction in anxiety symptoms among participants. Despite the slight increase in standard error from 0.62 to 0.78, which suggests less precision in the mean estimate post-intervention, the standard deviation increased from 3.40 to 4.25, reflecting greater variability in anxiety levels after the intervention. Similarly, the variance for GAD scores rose from 11.558 to 18.079, confirming the observed increase in variability. The Pearson correlation coefficient of 0.693 indicates a strong positive relationship between pre- and post-intervention scores, suggesting that changes in GAD scores were closely related. Statistically, the p-value for GAD was significantly low (close to 0), confirming the changes in anxiety scores were meaningful and allowing for the rejection of the null hypothesis of no difference. Regarding PSS, the mean score also decreased from 31.27 to 19.7, indicating a reduction in perceived stress levels. The variance for PSS slightly increased from 21.58 to 23.39, but the Pearson correlation of 0.1725 revealed a weaker relationship compared to GAD. Overall, both measures suggest that the intervention had a positive impact on reducing anxiety and stress, with statistically significant changes observed in GAD scores.

VII. Conclusion

In conclusion, the intervention aimed at addressing Generalized Anxiety Disorder (GAD) and perceived stress demonstrated significant efficacy in reducing anxiety symptoms and stress levels among participants. The marked decrease in the mean GAD score from 16.4 to 12.7 reflects a substantial improvement in participants' mental health. Although the post-intervention data exhibited increased variability in GAD scores, as indicated by the rise in standard deviation and variance, the strong positive Pearson correlation (0.693) between pre- and post-intervention scores underscores the effectiveness of the intervention. Furthermore, the statistically significant p-value reinforces the reliability of these findings, allowing for the rejection of the null hypothesis regarding the absence of differences in anxiety levels. Similarly, the reduction in perceived stress, with the mean score dropping from 31.27 to 19.7, indicates a favorable outcome. While the relationship observed in the PSS scores was weaker than that of GAD, the slight increase in variance still suggests a meaningful change in participants' stress levels. Overall, the results affirm the intervention's positive impact on both anxiety and perceived stress, highlighting its potential as a valuable resource in promoting mental well-being.

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