

The relationship between emotional and behavioral problems, and parent-child interaction and parental self-efficacy in children and adolescents with cerebral palsy

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ABSTRACT

Objective: Our aim was to investigate relationships between emotional and social/behavioral difficulties and parental self-efficacy and parent-child interaction in children and adolescents with cerebral palsy (CP).

Materials and Methods: Seventy-eight children and adolescents with different clinical types of CP aged 11-17 years (mean age: 13,35±2,6; 40 males, 38 females) were enrolled in the study. Availability of emotional and social/behavioral difficulties was measured with a self-reported version of the Strength and Difficulties Scale (SDQ)-for ages 11-17 and quality of parent-child interaction was measured with the Parent-Child Communication Scale (PCCS). The Parental Self-Efficacy Scale (PSES) was administered to measure parents' belief in their capacity to effectively parent their children.

Results: 35.9% of children adolescents with CP in this study had abnormal SDQ-overall and prosocial subtest scores. More specifically, children and adolescents with CP in low mobility levels (Gross Motor Function Classification System [GMFCS]- IV-V) were more likely to have severe emotional and social/behavioral symptoms (75%) compared to those with high mobility levels (GMFCS I-III) (18.5%). Individuals with spastic quadriplegia, dyskinetic, and ataxic CP were found to be more vulnerable to both emotional (71.4%) and social/behavioral difficulties (87%) than those with spastic hemiplegic and spastic diplegic CP (for hemiplegic and diplegic CP: rate of emotional problems; 16% and rate of social/behavioral difficulties: 8%). Importantly, we found that emotional problems availability showed a strong correlation with the quality of parent-child interaction ($r = -0.78$) and a good correlation with the parental self-efficacy ($r = 0.65$).

Conclusion: Children and adolescents with low mobility levels or with spastic quadriplegic, dyskinetic, and ataxic CP are more susceptible to emotional problems and social/behavioral difficulties compared to those with high mobility levels or hemiplegic and diplegic CP. Poor parent-child interaction and parental self-efficacy are significantly associated with the availability of mental health disorders and social/behavioral symptoms in children and adolescents with CP.

Keywords: cerebral palsy, child, adolescent, emotional, social/behavioral

Research Article

Received 24-05-2023

Accepted 14-06-2023

Available Online: 16-06-2023

Published 30-06-2023

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INTRODUCTION

Cerebral palsy (CP) is the most common childhood developmental disorder ¹ affecting both physical and emotional development in children and adolescents, as described in the International Classification of Functioning, Disability, and Health ². From this perspective, CP is a complex syndrome rather than a unique condition, and in this respect, it differentiates from other neurodevelopmental or neurological diseases ³. Therefore, individuals with CP have also been reported to have mental health disorders including emotional, social behavioral, and attention deficit disorders, in addition to postural and movement disorders ^{4, 5}. Especially, activity limitations ⁶ (<60 minutes per day), participation restrictions ⁷, pain ⁸, and sleep disorders ⁹ are responsible for a significant proportion of mental health disorders and social/behavioral difficulties in children and adolescents with CP. That is, individuals with CP are at greater risk for mental health disorders than their typical developing peers because of the problems described above ⁵. In other words, low level of physical activity, participation restriction, musculoskeletal pain, and poor quality of life that result in mental health problems in the general population are even more risky for mental health in individuals with CP ⁹⁻¹².

The pooled prevalence of mental health disorders in children and adolescents with CP was reported as 35% in a recently published systematic review, with variable rates across the included studies [95CI:20-61]¹³. However, the review's authors concluded that further research is needed to investigate the prevalence of mental health disorders for subgroups including CP typologies, motor involvement severity, and age.

Healthy family relationships are a main component of a child's overall well-being. More specifically, positive communication among family members may have a significant effect on a child's mental and social health. Furthermore, healthy family relationships could help children cope with stress and improve self-esteem, positive behavior, social interaction, and establishing the basis for healthy and trustworthy interactions with others¹⁴. Therefore, healthy family relationships are so essential because they bolster psychological and emotional well-being, provide children a feeling of belonging, and develop crucial life skills such as empathy, and parent-child interaction¹⁵. As a result, a healthy family environment, in which the parent-child interaction is of high quality, promotes the child's physical, emotional, and social development¹⁶. Importantly, in family environments where parent-child interaction is effective, children, especially those with cognitive or intellectual disorders¹⁷, express themselves better, thus leading to for developing their self-reliance¹⁶. Thus, parents of children with developmental disabilities (e.g., CP) should become more aware and educated because of the multiple problems their child experiences. Parental self-efficacy (PSE) signifies parents' belief in their ability to positively influence their child to achieve success and has been recently identified as a critical factor in promoting positive parent-child functioning¹⁸. In other words, it is a measure of how confident parents are in their capacity to provide for their children's needs¹⁹. PSE is critical to parent-child adjustment and encompasses parents' attitudes and behaviors regarding their competency as parents²⁰. As a result, parental self-efficacy is crucial for the development of mental health and social/behavioral properties in children and adolescents with CP. However, parents of individuals with physical disabilities, including CP, have unique barriers, risks, and challenges. Thus, the mental health (e.g., self-efficacy) of parents of people with CP is usually compromised as they spend more time caring for their children^{21,22}. Parenting children with physical disabilities is, thus, more challenging than parenting typically developing children and this is likely to pose an additional risk to the mental health of parents of individuals with CP. Therefore, improving the self-efficacy and self-esteem of parents of children and adolescents with CP is critical to their children's physical, intellectual, social, and emotional development. Consequently, an examination of the associations between mental health disorders, and the quality of parent-child interaction and parental self-efficacy in children and adolescents with CP is needed to better understand the importance of empowering parents through psychoeducational or psychological interventions. Therefore, the purpose of this study was to examine the relationships between emotional and social/behavioral difficulties, and parental self-efficacy and parent-child interaction.

MATERIAL and METHODS

A total of 78 children and adolescents with different CP typologies aged between 11 and 17 years and their parents were included in the study. The ethical approval for the study design was obtained from the Ethical Review Committee for Scientific Research and Publication at Mus Alparslan University with the number 03/13/2023-86774. Before the start of the study, the participants were informed in detail about the objective and procedure of the study and then informed consent was obtained from each one. Potential participants who did not wish to participate or who did not sign the written informed consent form were excluded from the study.

Participants

A priori sample size of 78 participants was calculated based on the data of the Strength and Difficulties Questionnaire (SDQ)-hyperactivity subtest from a previous study²³, $r=0.42$, effect size $=0.64$, $\alpha=0.05$, and $\beta=0.80$, using G*Power v.3²⁴. The mean age of participants was 13.35 ± 2.6 and all of them had a diagnosis of any CP types obtained from the medical committees in public or research hospitals. Participants mobility levels changed between walking without restrictions and transported in a manual wheelchair, as measured by the Gross Motor Classification System (levels I-V). All children and adolescents with CP were recruited in the study who had sufficient cognitive performance and communication ability to understand and appropriately answer each item of the questionnaire used in the study. Subjects with (1) one or more comorbidities interfering with the assessment process, (2) no written consent, and (3) severe intellectual disability ($IQ < 70$) were excluded from the study.

Assessment

To avoid interfering with the child's weekly practice, the assessment process was conducted before or following the physiotherapy session. Moreover, for non-literacy parents, items of the outcome measures were carefully read and explained by an experienced physiotherapist.

Strengths and Difficulties Questionnaire

The SDQ is a behavioral screening questionnaire designed to describe mental health disorders and social/behavioral difficulties in children and adolescents aged 2 to 17 years²⁵. There are various versions of the SDQ (2-4, 4-10, 11-17, and 18 + years), and in the current study, a self-report version of SDQ (for 11 to 17 years old) was used. SDQ consists of 5 subscales (emotional symptoms, conduct problem, hyperactivity/inattention, peer problem, and prosocial problem) and 25-items (5 items for each subscale) that rate the frequency of behavior on a 3-point Likert scale, where 0 = not true, 1 = somewhat true, and 2 = certainly true²³. The overall difficulty score is generated from subscale scores apart from the prosocial subscale score (ranging from 0 to 40), with the highest scores being of most concern. The prosocial subscale score is excluded from the calculation of the child's emotional well-being; rather, its score is calculated separately (ranging from 0 to 10), with lower scores implying that the child has social impairments. A four-fold classification was recently introduced to describe the mental health profile, where 0-13 = close to average, 14-16 = slightly raised, 17-19 = high, and 20-40 = very high. On the other hand, cut-points for SDQ-prosocial subtest scores are as follows : 8-10 = close to average, 7 = slightly raised, 6 = high, and 0-5 = Very high, i.e., the lowest scores being of most concern²⁶.

The adaptation of the SDQ original version into Turkish and investigation of its psychometric properties in the relevant population were done by Güvenir et al.²⁷ and it was found that SDQ had good psychometric properties.

Parent-Child Communication Scale

The Parent-Child Communication Scale (PCCS) was developed to be applied to parents of children and adolescents between the ages of 0 and 18 years to assess the quality of parent-child interaction. PCSS consists of 5 subdomains and 27 items questioning the effectiveness of parent-child interaction on a 5-likert scale: 5=always, 4= often, 3= sometimes, 2= occasionally, 1=never. The questionnaire mean score is calculated based on the sum of each item's score divided by the total number of items applied, with higher scores indicating greater parent-child interaction. PCSS is valid and reliable to assess parent-child communication²⁸.

Perceived-Parental Self-Efficacy Scale

The Perceived-Parental Self-Efficacy Scale (PSES) is a parent/caregiver report to assess "parent's capability to maintain open communication with their children, support their children's efforts to gain self-reliance and manage new challenges, achieve consensus on personal responsibilities, firmly handle violations of rules and commitments, prevent disagreements from escalating into open conflicts, and make time enjoyable for activities with their children ". The original version of the PSES has 12 items that rate parental self-efficacy on a 7-likert scale: 1=not well at all, and 7=very well²⁹. The Turkish version of the PSES consists of 11 items (1 item from the original version was dropped off) and is valid and reliable in the Turkish population³⁰.

Gross Motor Function Classification System- Expanded & Revised

The Gross Motor Function Classification System - Expanded and Revised (GMFCS-E&R) is a 5-level classification system for describing the gross motor function of children and adolescents with CP, with Level I indicating a higher mobility level or less motor impairment³¹. Of the GMFCS levels, GMFCS I-II (sometimes I- III) represent high levels of mobility, while GMFCS IV-V characterizes low levels of mobility³².

Statistical Analysis

Statistical analyses were conducted using SPSS v.25. The variables were investigated using visual (histogram, probability plots) and analytical method (Shapiro-Wilk's test) to determine whether they were normally distributed. Descriptive information was outlined as mean and standard deviation for continuous variables and as frequency and rate for nominal and ordinal variables. Distributions of subgroups, including CP types and mobility levels, within mental health profiles were calculated using custom tables. Correlation coefficients between predefined variables were examined using Spearman's correlation test since variables were normally distributed. Possible correlation coefficients were described as follows: $r \geq 0.8$; very strong or excellent, $0.6 \leq r < 0.8$; strong, $0.4 \leq r < 0.6$; moderate, and $0.2 \leq r < 0.4$; weak³³

RESULTS

Descriptive information of the study's participants, including diagnosis, mobility level, parental education level, monthly income, and residency type, is provided in **Table I**.

Table I: Demographic Characteristics of the Study Participants

Number of Participants (n=78)		
Age (max-min) (M \pm SD)	11-17 (13,35 \pm 2,6)	
Gender	n	%
Male	40	5.3
Female	38	48.7
School Status		
Yes	46	59
No	32	41
Type of CP		
Spastic Hemiplegic	34	43.6
Spastic Quadriplegic	22	28.2
Spastic Diplegic	16	20.5
Dyskinetic	4	5.1
Ataxic	2	2.6
Mobility Level/Motor Impairment		
GEMFCS I	30	38.5
GEMFCS II	16	20.5
GEMFCS III	8	10.3
GEMFCS IV	10	12.8
GEMFCS V	14	17.9
Caregiver's Education level		
Non-Literacy	12	15.4
Primary School	40	51.3
High School	18	23.1
University	8	10.3
Family Status		
Together	72	92.3
Divorced	6	7.7
Residency Type		
Apartments in Downtown	32	41
Detached Houses in Downtown	24	30.8
Rural	22	28.2
Monthly Income		
264,67 USD	28	35.9
321,48 USD	22	28.2
437,03 USD	12	15.4
481,56 USD and over	16	20.5

M, Mean; SD, Standard Deviation; GMFCS; Gross Motor Classification System; CP, Cerebral Palsy; USD, United States Dollar

According to a four-fold classification provided for the SDQ-overall and prosocial subscale scores, 35.9% (28 in 78) children and adolescents in the study had uneven mental health and social/behavioral profiles (**Table II**).

Participants with high mobility levels of GMFCS (Level I-III) were more likely to achieve positive outcomes for mental health disorders and social/behavioral difficulties (81.5%). Contrarily, participants with low functioning level of GMFCS (Level IV-V) had an increased risk of both mental health disorders and social/behavioral difficulties (18 in 24; 75%) (**Table III**).

Children and adolescents with hemiplegic and diplegic CP had better mental health (42 in 50; 84%) and social/behavioral profiles (46 in 50; 92%) than those with quadriplegic, dyskinetic, and ataxic CP (close to normal mental health and social/behavioral profiles: 28.5% and 14.3%, respectively). In other words, individuals with quadriplegic, dyskinetic, and ataxic CP were found to be more prone to both mental health disorders and social/behavioral difficulties (**Table IV**).

Relationship Between Mental Health Disorders and Parent-Child Interaction and Parental Self-Efficacy.

Correlational analyses revealed that the total difficulties score (SDQ-overall score) was strongly associated with the score of quality of parent-child interaction ($r=-0.78$, $P<0.001$). Similarly, the parental self-efficacy had a strong correlation coefficient with SDQ-overall score ($r=-0.65$). More specifically, correlation coefficients between SDQ-emotional symptoms, conduct problems, hyperactivity, and peer problem subtest scores, and parent-child interaction scaled scores changed moderate to strong ($r=-0.44$ to $r=-0.68$; $P<0.05$). Furthermore, SDQ-subtests scores and the parental self-efficacy scaled score exhibited moderate-to-strong correlations ($r=-0.49$ to $r=-0.76$; $P<0.05$). (**Table V**)

Table II: The Mental Health and Social/behavioral Profiles of the Participants by SDQ-overall and Prosocial Scores

Cutoffs for SDQ-overall score	Close to Average (0-13)	Slightly raised (14-16)	High (17-19)	Very High (20-40)
N (%)	34 (43.5)	16 (20.5)	14 (17.9)	14 (17.9)
Cutoffs for SDQ-Prosocial score	Close to Average (8-10)	Slightly raised (7)	High (6)	Very High (0-5)
N (%)	44 (56.4)	6 (7.7)	12 (15.4)	16 (20.5)

SDQ, Strength and Difficulties Questionnaire

Table III: Custom Tables of the Mental Health Social/ Behavioral Profiles Status within Mobility Level by GMFCS

		Mobility Level/Motor Involvement Severity				
		GMFCS I	GMFCS II	GMFCS III	GMFCS IV	GMFCS V
		n	n	n	n	n
Cutoffs for SDQ-overall score	Close to Average	20	8	4	0	2
	Slightly raised	6	4	2	4	0
	High	4	2	2	4	2
	Very High	0	2	0	2	10
Cutoffs for SDQ-Prosocial score	Close to Average	24	14	4	0	2
	Slightly raised	2	0	0	2	2
	High	4	0	0	4	4
	Very High	0	2	4	4	6

n; number of participants; SDQ, Strength and Difficulties Questionnaire; GMFCS, Gross Motor Classification System

Table IV: Custom Tables of the Mental Health and Social/Behavioral Status within the Type of the Cerebral Palsy

		Diagnosis				
		Spastic Hemiplegia	Spastic Quadriplegia	Spastic Diplegia	Dyskinetic	Ataxic
		n	n	n	n	n
Cutoffs for SDQ-overall score	Close to Average	18	4	12	0	0
	Slightly raised	10	4	2	0	0
	High	4	8	0	2	0
	Very High	2	6	2	2	2
Cutoffs for SDQ-Prosocial score	Close to Average	28	2	14	0	0
	Slightly raised	4	2	0	0	0
	High	2	8	0	2	1
	Very High	0	10	2	2	1

n; number of participants; SDQ, Strength and Difficulties Questionnaire

Table V: Relationships between mental health disorders and parent-child interaction and parental self-efficacy

SDQ -subscales	Parent-Child Interaction	Parental Self-Efficacy
SDQ- emotional symptoms	r=-0.58 P<0.05	r= -0.51 P<0.05
SDQ- conduct problems	r=-0.68 P<0.001	r-0.49 P<0.05
SDQ- hyperactivity/inattention	r=-0.44 P<0.001	r=-0.76 P<0.001
SDQ- peer relationship problems	r=-0.60 P<0.001	r=-0.54 P<0.05
SDQ- overall score (total difficulty score)	r=-0.78 P<0.001	r=-0.65 P<0.001
SDQ- prosocial behavior	r=0.67 P<0.001	r=0.52 P<0.05

SDQ, Strength and Difficulties Questionnaire

DISCUSSION

Our study first showed that children and adolescents with CP are susceptible to mental health disorders and social/behavioral difficulties. Then, study findings revealed that mental health disorders and social/behavioral difficulties are substantially correlated with the quality of parent-child interaction and parental self-efficacy. To our best knowledge, this is the first study to date investigating relationships between mental health disorders and, quality of parent child-interaction and parental self-efficacy in children and adolescents with CP.

Mental health disorders account for a significant proportion of the general health problems worldwide³⁴. More significantly, most health problems are significantly associated with physical disabilities³⁵. Importantly, individuals with developmental disabilities are more likely to experience pain, depression, anxiety, reduced self-reliance, and activity limitations compared to their typically developing peers³⁶. As a result, children and adolescents with CP are at higher risk for psychosocial and mental health problems due to physical risk factors and musculoskeletal pain⁵. Therefore, considering that CP is the most common cause of childhood-onset physical disability³⁷, preventing or reducing of development of mental health disorders is a major public health concern in children with CP.

Study findings revealed that almost one-third of children and adolescents in the study had severe mental health disorders and social/behavioral difficulties. This is consistent with a previously published systematic review, which reported the pooled prevalence of mental health disorders as 35% in the population with CP. However, in the current literature, there is heterogeneity between studies as to the prevalence rate, ranging from 19% to 57%¹³. With respect to the prevalence rate of mental health disorders and social/behavioral difficulties by mobility level or motor involvement severity, we found that low mobility level increased the likelihood of an abnormal total difficulty score on the SDQ. In other words, individuals with low mobility levels in GMFCS (IV-V) were more likely to have uneven cognitive profiles. This can be explained by the fact that individuals with severe motor impairments are more likely to have more physical and social risk factors that increase the odds of psychosocial, emotional, and communication disorders.

In terms of CP subgroups, it was discovered that children and adolescents with hemiplegic and diplegic CP reported fewer mental health disorders and social/behavioral difficulties than those with quadriplegia, dyskinetic, and ataxic CP. This can be explained by the fact that individuals with hemiplegic and diplegic CP experience less functional motor impairments than those with other CP subtypes³⁸, which has been previously documented to be a key factor in community participation³⁹. This finding is crucial for establishing the prevalence of mental health disorders for CP subgroups, which has been identified as a research gap by a recent systematic review¹³.

Relationship Between Mental Health Disorders, and Parent-Child Interaction and Parental Self-Efficacy

It is well-known that the parent-child interaction is critical for children's psychomotor development, including cognitive, emotional, motor, and social development⁴⁰. More specifically, the effective parent-child interaction has important implications for both children's psychosocial and mental health⁴¹. Therefore, parent-child interaction is central to the development of the mental health of children with CP, who present more physical, emotional, and cognitive developmental disadvantages compared to their normally developing peers. In other words, effective parent-child interaction, which is important for the general population, is even more crucial for individuals with CP. The current study's findings reinforced this fact in the context of the significant links between parent-child interaction and the mental health disorders reinforced this fact. Consistent with the study's aim, effective parent-child interaction was intimately related to greater mental health profiles in children and adolescents with CP. Therefore, effective parent-child interaction has the potential to decrease the risk of four aspects of mental health disorders and prosocial behavioral problems in individuals with CP. Research has shown that positive parent-child interactions are associated with a range of positive outcomes for children, including better emotional and social development, higher self-esteem, and better academic achievement⁴². Effective parent-child interactions can be promoted through a range of strategies, including responsive and sensitive parenting, setting appropriate limits and boundaries, providing emotional support and validation, and engaging in positive and enjoyable activities together⁴³.

Parenting programs or parent-child interaction therapy can also help parents develop and enhance their interactions with their children, promoting positive development and well-being for both parents and children. Therefore, as described in a recent study, empowering parents of individuals with CP through psychoeducational or psychological interventions is essential in improving mother-child interaction and parental mental health⁴⁴.

As mentioned earlier, parental self-efficacy relates to parents' belief in their ability to effectively raise their children. Parental self-efficacy can be influenced by a variety of factors, such as past parenting experiences, cultural and societal expectations, parenting stress, maternal depression, and support from family and friends⁴⁵. According to research, increased parental self-efficacy is linked to better parenting practices, better child outcomes, and greater parental role satisfaction⁴⁶. Developing supportive networks, focusing on good parenting experiences, and seeking out knowledge and resources are all strategies that can assist parents in achieving and maintaining high levels of parental self-efficacy⁴⁷. In the current study, we found that parental self-efficacy was significantly associated with both mental health disorders and prosocial behavioral problems in children and adolescents with CP. That is, greater parental self-efficacy has been shown to attenuate concerns about the mental health and prosocial behavior of children and adolescents with CP. As a result, given that depression and anxiety are prevalent in parents of children with CP²¹, and that these psychiatric problems adversely affect families' capability to manage their children's mental health disorders⁴⁸, the importance of building parental self-efficacy to enhance the social, cognitive, and social behavioral status of children with CP can be easily understood. In this way, parents can improve their parenting skills and gain more self-assurance, which can benefit both them and their children.

Limitations

Although the study sample size was calculated to be 78, this sample size could not adequately include all CP subgroups, which negatively impacted the generalizability of the results, particularly for ataxic and dyskinetic subgroups. In addition, we did not ask whether study participants had received psychiatric/psychotherapeutic treatment from a psychologist or psychiatrist in the months before study entry. Therefore, these potential limitations or biases may need to be addressed in future studies.

CONCLUSION

Children and adolescents with low functioning levels or with quadriplegic, dyskinetic, and ataxic CP are more susceptible to mental health disorders and social impairments than those with high mobility levels or hemiplegic and diplegic CP. Although some previous studies have reported the prevalence of mental health disorders in the general population with CP; to our best knowledge, this is the first study investigating this subject within CP subgroups. Four aspects of mental health disorders and social/behavioral difficulties were significantly related to the quality of parent-child interaction or parental self-efficacy in children and adolescents with CP. In this context, parent-child interaction and parental self-efficacy are crucial to supporting the development of mental health and social/behavioral functioning in children and adolescents with

CP. Therefore, parent-child interaction therapy or parental education programs such as psychoeducational or psychological interventions are critical in promoting parent-child interaction and parental self-efficacy to reduce the potential risks of mental health disorders and social/behavioral difficulties in children and adolescents with CP.

Acknowledgements: none

Conflict of interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contributions: **HB, NT, ŞB, MKG:** Data Collection, design of the study, **HB:** manuscript preparation, revisions. All the authors have read, and confirm that they meet, ICMJE criteria for authorship.

Ethical approval: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and/or with the Helsinki Declaration of 1964 and later versions.

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