

PARENT PERSPECTIVES ON ROBOTIC-ASSISTED GAIT TRAINING FOR CHILDREN WITH CEREBRAL PALSY – A CROSS-SECTIONAL STUDY

PERSPEKTIVE RODITELJA O ROBOTSKI POTPOMOĞNUTOM TRENINGU HODA ZA DECU SA CEREBRALNOM PARALIZOM – STUDIJA PRESEKA

Dragana DJURIC¹, Sunitha BHAGAVATHI MYSORE¹, Tariq AI YAMANI², Ahmed ISLEEM², Adam ZEGHAN³ and Muhammad AI JARRAH¹

ORCID NUMBER

Dragana Djuric – 0000-0002-1583-8813
Sunitha Bhagavathi Mysore – 0000-0003-3722-4342
Tariq Al Yamani – 0009-0003-6164-597X

Ahmed Isleem – 0009-0000-0632-2949
Adam Zeghan – 0000-0001-7398-8417
Muhammad Al Jarrah – 0000-0003-2948-6932

Fatima College of Health Sciences, Abu Dhabi, UAE¹
Zayed Authority for People of Determination, Abu Dhabi, UAE²
Southern Heights Physiotherapy Center, Amman, Jordan³

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Abstract

Introduction. Robotic-assisted gait training is a high-technology rehabilitation intervention that has gained increasing popularity over the past two decades. However, limited research has explored how the parents of children with cerebral palsy perceive this intervention. The aim of this study was to examine parents' perspectives on robotic-assisted gait training with regard to the child's experience, its effects on impairments, and functional activities. **Material and Methods.** A total of 24 participants, including 23 mothers of children with cerebral palsy, completed an online cross-sectional survey distributed via SurveyMonkey. The survey was administered two months after completion of 20 sessions of robotic-assisted gait training. **Results.** All parents (100%) reported that robotic-assisted training was an enjoyable experience for their child and highly valued the quality of communication between the therapist and the child. Parents observed improvements in self-confidence (79.17%), muscle endurance (79.16%), muscle flexibility (66.66%), and reduced muscle tightness (78.26%). Additionally, improvements were noted in standing posture (54.07%), the ability to walk longer distances (62.50%), functional activities in daily life (66.66%), and participation levels (75%). **Conclusion.** Parents perceived robotic-assisted gait training as an engaging intervention that positively influences physical health, self-confidence, and happiness. Improvements in motor activities, participation in daily life, and quality of life were observed following 20 sessions of robotic-assisted gait training.

Key words: Gait; Robotics; Exercise; Cerebral Palsy; Parents; Motor Skills; Quality of Life

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Introduction

Cerebral palsy (CP) is a non-progressive neurodevelopmental disorder affecting motor and sensory

Sažetak

Uvod. Robotski potpomognuti trening hoda je visokotehnoška intervencija koja je stekla popularnost u poslednje dve decenije. Međutim, postoji nedostatak istraživanja o tome kako roditelji dece sa cerebralnom paralizom doživljavaju robotski potpomognuti trening hoda. Cilj studije bio je da se sagleda perspektiva roditelja dece sa cerebralnom paralizom o uticaju robotskog treninga hoda na detetovo iskustvo, na telesna oštećenja i funkcionalne sposobnosti. **Materijal i metode.** Dvadeset četiri ispitanika, među kojima je bilo dvadeset tri majke dece sa cerebralnom paralizom, popunilo je upitnik. Studija preseka sprovedena je putem onlajn ankete (*SurveyMonkey*), dva meseca nakon završetka 20 terapija robotskog treninga hoda. **Rezultati.** Svi roditelji (100%) smatraju da je robotski trening hoda zabavna intervencija i visoko su ocenili komunikaciju između terapeuta i deteta. Roditelji su izvestili o poboljšanju samopouzdanja (79,17%), povećanoj mišičnoj izdržljivosti (79,16%), većoj fleksibilnosti mišića (66,66%) i smanjenoj ukočenosti mišića (78,26%). Takođe su uočili poboljšanje posture u stojećem položaju (54,07%), hodanje na duže udaljenosti (62,50%), povećane funkcionalne aktivnosti u svakodnevnom životu (66,66%) i veću participaciju dece (75%). **Zaključak.** Roditelji smatraju da je robotski potpomognuti trening hoda intervencija koja podstiče aktivno učešće, poboljšava fizičko zdravlje, samopouzdanje i sreću dece. Roditelji su primetili da nakon 20 treninga postoje poboljšanja u motoričkim aktivnostima, participaciji i kvalitetu života.

KLjučne reči: hod; robotika; trening; cerebralna paraliza; roditelji; motorika; kvalitet života

function due to brain lesions, and consequently impairing movement, posture, and gait [1]. Motor impairments are frequently accompanied by additional disturbances, including deficits in cognition, sensation, communication, perception, behavioral regulation, and musculoskeletal complications [2]. Due to its complexity, CP management requires a multidimensional, individualized approach with clearly defined functional goals.

✉ Corresponding author: Dragana Djuric, E-mail: dragana.djuric11@gmail.com

Abbreviations

CP	– cerebral palsy
RAGT	– Robotic-Assisted Gait Training
GMFCS	– Gross Motor Function Classification System
ROM	– range of motion
QOL	– quality of life
ICF	– International Classification of Functioning, Disability and Health

Parental involvement is a crucial component to effective rehabilitation for children with CP. A family-centered approach emphasized early engagement of parents in the rehabilitation process, including participation in therapeutic decision-making and consideration of parental perspectives [3]. Ongoing parent education and home exercise programs enable caregivers to recognize changes and monitor progress in their children. Active collaboration between health-care professionals and parents has been shown to increase satisfaction with treatment outcomes for both therapists and families [4].

Robotic-assisted gait training (RAGT) is a high-technology rehabilitation intervention that supports the patient using adjustable robotic orthoses (exoskeletons) for each leg, a body weight support system, a treadmill, and a feedback screen [5,6]. A key feature of RAGT is the delivery of intensive, repetitive practice of physiological gait patterns [7–9]. The system integrates computer-controlled algorithms with video-based feedback, encouraging active cognitive and motor engagement during training [10–12]. RAGT has demonstrated potential benefits, including improvements in gait speed and endurance, stride length, cardiovascular fitness, balance, lower-limb muscle strength, motor planning, and other physiological functions [9,10,13]. Some studies suggest that RAGT may be more effective than conventional therapy improving gait speed, walking distance, and complex locomotor skills such as running and jumping in children with CP [11]. Despite the controversial results, scientific evidence does not clearly demonstrate superiority of RAGT over conventional therapies as it is generally considered an adjunct rather than a replacement for conventional physiotherapy [14–17].

Most existing research on RAGT has focused primarily on motor outcomes assessing standardized clinical measures [6,18–21]. In contrast, relatively few studies have explored the impact on quality of life (QOL) and daily functioning. A meta-analysis has suggested that RAGT may improve quality of life in adults with neurological impairments [22]. However, data addressing parent-reported outcomes related to QOL and daily life participation of children with CP remain limited. Given that parents are the primary caregivers and are often best positioned to observe subtle changes in their child's function, behavior, and

participation, their perspectives are particularly valuable. Therefore, the aim of this study was to explore parental perspectives on the effects of RAGT, used as an adjunct to conventional physiotherapy.

Material and Methods

This cross-sectional survey study was conducted at the Zayed Authority for People of Determination, Abu Dhabi, UAE. Ethical approval was obtained from the Ethics Committee of Fatima College of Health Sciences, Abu Dhabi (INTSTF018PHY20). The study population consisted of parents of 26 children with CP who completed 20 RAGT sessions (five sessions per week, each lasting 40 minutes) using the Lokomat® system (Hocoma AG, Volketswil, Switzerland).

The survey was developed in English based on the International Classification of Functioning, Disability and Health (ICF) framework. It comprised five sections, beginning with information about the study purpose, informed consent, and parent demographics, followed by 20 survey items. Of these, 18 were mandatory closed-ended questions and 2 were optional open-ended questions that allowed parents to express positive or negative views regarding RAGT. The closed-ended questions addressed five domains: child behavior, impairments, mobility, participation, and quality of life. Responses were recorded using a five-point Likert scale. For analysis, responses of “strongly agree” and “agree” were classified as positive, “strongly disagree” “disagree” as negative, and “neutral” as neither positive nor negative. The final section of the survey thanked participants for their time and contribution.

The survey was reviewed by two pediatric rehabilitation researchers, who confirmed its conceptual framework and suggested minor revisions. The finalized version was translated into Arabic and distributed via SurveyMonkey through the therapy center. Survey links were sent to parents' mobile phones, and oral instructions regarding completion were provided. Data collection took place between May and July 2021. Parents were given up to eight weeks to complete the survey, with two reminder messages sent four weeks after initial distribution.

Closed-ended survey responses were analyzed using descriptive statistics. Open-ended responses were analyzed using qualitative content analysis to identify core themes and summarize parental perspectives. Representative quotes were selected and included in the Results section.

A total of 26 children completed the RAGT program, with a mean age of 7.69 ± 2.90 years. Of these, 61.5% were boys and 38.5% were girls. Bilateral cerebral palsy was present in 73.1% of the children, while

Table 1. Characteristics of children who completed Robotic-Assisted Gait Training

	n (%) / mean ± sd
Age	7.69±2.90
<6	8 (30.8%)
6-11.9	14 (53.8%)
12+	4 (15.4%)
Gender male	16 (61.5%)
Form	
Diplegia	13 (50%)
Hemiplegia	7 (26.9%)
Quadriplegia	3 (11.5%)
Mix	2 (7.7%)
Triplegia	1 (3.8%)
GMFCS level	
I	2 (7.7%)
II	8 (30.8%)
III	7 (26.9%)
IV	9 (34.6%)

Results are presented as mean ± sd or count (%)

26.9% had a unilateral form. According to the Gross Motor Function Classification System (GMFCS) [22], 61.5% of the children had moderate to severe CP, classified as levels III–IV (26.9% at level III and 34.5% at level IV), whereas 38.5% had mild impairment at levels I–II (7.7% at level I and 30.8% at level II). Detailed participant characteristics are presented in **Table 1**.

Results

The survey was completed by 24 parents, while 2 did not respond despite reminder messages. Participation was voluntary and responses were anonymous; therefore, the reasons for non-response could not be determined. Parental education levels were as follows: 10 parents held a university degree, 3 had vocational training, 7 had completed high school, 2 had elementary education, and 2 did not provide this information (**Table 2**).

The results are presented in five sections corresponding to the survey domains: child behavior, impairments, mobility, participation, and quality of life. Responses to the first 18 closed-ended questions are

summarized in **Tables 3–6**. Findings from the open-ended question are presented separately.

As shown in **Table 3**, 23 parents (100%) responded to the question regarding the entertainment value of RAGT, with all respondents rating it positively; one parent did not answer this item. All 24 parents (100%) expressed a positive perception of communication between the therapist and the child. Regarding active participation and motivation to earn points through video games during RAGT, 21 parents (87.5%) reported positive responses, while 3 (12.5%) selected a neutral response. A positive change in the child’s confidence and self-esteem was reported by 19 parents (79.2%), whereas 5 (20.8%) expressed no clear opinion. Perceptions of training intensity varied: 11 parents (45.8%) viewed the level of tiredness during or after sessions negatively, 9 (37.5%) perceived it positively, and 4 parents (16.7%) reported neutral responses.

Impairments

Overall, parents reported favorable effects of RAGT on physical impairments. Increased lower-limb strength and endurance were observed by 19 parents (79.2%),

Table 2. Parental Education Levels

Education Level	Number/% of Parents
University degree	10 (41.7%)
Vocational education	3 (12.5%)
High school	7 (29.2%)
Elementary school	2 (8.3%)
No response	2 (8.3%)

n = number of participants; % = percentage of total respondents

Table 3. Child's behavior domain

Questions	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Positive attitude	Negative attitude
1. Your child has fun while being part of the RAGT research project.	13 (54.17%)	10 (41.67%)	0%	0%	0%	23 (100%)	0%
2. Your child was excited about Lokomat training and the video games challenges.	13 (54.17%)	8 (33.33%)	3 (12.50%)	0%	0%	21 (87.50%)	0%
3. Your child communicates well with therapists during the RAGT sessions.	15 (62.50%)	9 (37.50%)	0%	0%	0%	24 (100%)	0%
4. Your child shows more self-confidence after RAGT sessions.	4 (16.67%)	15 (62.50%)	5 (20.83%)	0%	0%	19 (79.17%)	0%
5. Your child feels tired and complain during and after RAGT session	3 (12.50%)	6 (25%)	4 (16.67%)	8 (33.33%)	3 (12.50%)	9 (37.50%)	11 (45.83%)

n = number of participants; % = percentage of total respondent

while 3 parents (12.5%) were neutral and 2 parents (8.3%) reported no improvement. Improvements in trunk strength were noted by 13 parents (54.2%), with 9 parents (37.5%) selecting neutral responses and 2 parents (8.3%) disagreeing. Greater range of motion in the lower extremities was reported by 16 parents (66.7%), compared with 7 parents (29.2%) who were neutral and 1 parent (4.2%) who disagreed. A reduction in spasticity was observed by 19 parents (79.2%), while 4 parents (17.3%) were neutral and 1 (4.2%) disagreed. These findings are summarized in **Table 4**.

Mobility

Responses related to postural control and mobility are summarized in **Table 5**. Improvement in standing stability were reported by 12 parents (50%), while 10 parents (41.7%) were neutral, and 2 parents (8.3%) reported no change. Similar findings were observed for standing posture, with 13 parents (54.2%) noting improvement, 9 parents (37.5%) reporting neutral responses, and 2 parents (8.3%) reporting no improvement. Regarding walking distances, 15 parents (62.5%) observed longer walking

durations following RAGT, 4 parents (16.7%) were neutral, and 5 parents (20.8%) reported no improvement. Improvements in balance and leg positioning were reported by 14 parents (58.3%), while 7 parents (29.2%) were neutral and 3 parents (12.5%) disagreed. Standing or walking as the preferred motor behavior was perceived by 13 parents (56.5%), with 8 parents (34.8%) selecting neutral responses and 2 parents (8.7%) disagreeing. Improvements in motor functions, such as standing up from a chair, picking up objects, and climbing stairs, were reported by 15 parents (66.7%), while 7 parents (29.2%) were neutral and 1 parent (4.2%) disagreeing.

Participation and quality of life

Within the participation domain, 18 parents (75%) reported increased social interaction at home and with peers, while 5 parents (20.8%) were neutral and 1 parent (4.2%) disagreed. Sustained effects two months after completion of RAGT were reported by 17 parents (73.9%), while 5 parents (20.1%) were neutral; one parent did not respond to this item. Improvements in quality of life were reported by 16 parents

Table 4. Impairment domain

Questions	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Positive attitude	Negative attitude
6. Your child become stronger (increased muscle strength and muscle endurance) on the lower limb after RAGT, compared to before the sessions.	5 (20.83%)	14 (58.33%)	3 (12.50%)	1 (4.17%)	1 (4.17%)	19 (79.16%)	2 (8.34%)
7. Your child become stronger (increased muscle strength and muscle endurance) in the trunk after the RAGT sessions.	3 (12.50%)	10 (41.67%)	9 (37.50%)	1 (4.17%)	1 (4.17%)	13 (54.17%)	2 (8.34%)
8. Your child has increased range of motions (mobility) in the hip, knee and ankle after RAGT compared with before.	5 (20.83%)	11 (45.83%)	7 (29.17%)	1 (4.17%)	0%	16 (66.66%)	1 (4.17%)
9. Your child has less spasticity (stiffness, tightness) in their lower legs after the RAGT sessions.	4 (17.39%)	15 (60.87%)	4 (17.39%)	0%	1 (4.35%)	19 (79.17%)	1 (4.35%)

n = number of participants; % = percentage of total respondents

Table 5. Mobility domain

Questions	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Positive attitude	Negative attitude
10. Your child is able to stand for a longer time (independently or with assistance) compared to before.	3 (12.50%)	9 (37.50%)	10 (41.67%)	1 (4.17%)	1 (4.17%)	12 (50%)	2 (8.34%)
11. Your child is able to stand with better posture (independently or with assistance) afterwards.	4 (16.57%)	9 (37.50%)	9 (37.50%)	1 (4.17%)	1 (4.17%)	13 (54.17%)	2 (8.34%)
12. Your child is able to walk longer distances (independently or with walker) after the sessions compared to before.	5 (20.83%)	10 (41.67%)	4 (16.67%)	4 (16.67%)	1 (4.17%)	15 (62.50%)	5 (20.84%)
13. Your child is able walk with better balance and better leg positioning (independently or with a walker) after the RAGT compared to before.	4 (16.67%)	10 (41.67%)	7 (29.17%)	3 (12.50%)	0%	14 (58.34%)	3 (12.50%)
14. Your child prefers standing or walking (independently or with walker) after the sessions in your home compared to before.	3 (13.04%)	10 (43.48%)	8 (34.78%)	2 (8.70%)	0%	13 (56.52%)	2 (8.70%)
15. Your child shows more motor activity in their daily life compared to before.	5 (20.83%)	11 (45.83%)	7 (29.17%)	1 (4.17%)	0%	15 (66.66%)	1 (4.17%)

n = number of participants; % = percentage of total respondents

Table 6. Participation and quality of life domain

Questions	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree	Positive attitude	Negative attitude
16. Your child shows more participation while engaging with family or friends compared to before the RAGT sessions.	5 (20.83%)	13 (54.17%)	5 (20.83%)	0%	1 (4.17%)	18 (75%)	1 (4.17%)
17. A positive benefit for your child is seen a few months after finishing the RAGT sessions.	4 (17.39%)	13 (56.52%)	5 (20.09%)	0%	0%	17 (73.91%)	0%
18. Has the quality of life improved for your child after they participated in the RAGT sessions? (Energy, tiredness).	8 (33.33%)	8 (33.33%)	7 (29.17%)	1 (4.17%)	0%	16 (66.66%)	1 (4.17%)

n = number of participants; % = percentage of total respondents

(66.7%), particularly related to increased energy levels and reduced fatigue. Seven parents (29.2%) reported neutral responses, and 1 parent (4.2%) disagreed. Findings are summarized in **Table 6**.

No negative comments regarding RAGT were reported. Three parents provided responses to the open-ended question describing positive experiences.

A parent of a child classified as GMFCS level IV stated: *“We noticed that our son is happier, and from the first week of RAGT we observed changes. Before RAGT, he mainly moved by crawling and could only take a few steps with our support. After the treatment, he is much more interested in walking and can now take more steps. It is now easier and quicker to change his diaper and to dress or undress him. We would love to repeat RAGT.”*

A parent of a child classified as GMFCS level III reported: *“My daughter stands more stably and walks longer with a walker after robotic treatment. We noticed that spasticity, especially in the calf muscle, has decreased. We would really like the robotic rehabilitation to continue.”*

A parent of a child who progressed from GMFCS level II to level I after the study shared: *“My daughter always wanted to walk in high-heeled shoes, but due to balance issues she couldn’t. After the study, she managed to do it and is very happy. She can now climb stairs independently, safely, and quickly without support.”*

Discussion

Robotic-assisted gait training (RAGT) has been used for nearly two decades as an adjunct therapeutic modality for children with cerebral palsy (CP). Incorporating parents’ perspectives provides valuable insight into the translational benefits of RAGT, extending beyond objective gait parameters or standardized clinical outcomes. Parents’ positive perceptions may reflect the value placed on even minimal improvements, which are considered meaningful in CP, where progression is typically slow or static after early childhood. However, qualitative and parent-centered research exploring perceived effectiveness of RAGD

remains limited. In a study by Beveridge et al., parents described RAGT as a revolutionary, inspiring, and safe intervention, valuing its effects on balance, motor function, and ambulation, although uncertainty remained regarding the transfer of these improvements into daily functional tasks [1].

In our study, all parents highlighted the entertaining nature of RAGT, particularly the integrated video-game components. The video-game interface appeared to enhance motivation by promoting active participation [2]. The platform's graded progression, from simplified tasks suitable for children with cognitive impairments to more complex game levels, allowed individualized challenge and sustained interest [24]. Children often identified with game characters or imagined themselves as robots, further increasing their enthusiasm for therapy [1]. The simultaneous motor and cognitive demands of RAGT may promote motor learning through intensive, repetitive, and task-oriented practice, thereby facilitating neuroplasticity [3,4]. Supporting this, Fu et al. demonstrated superior improvements in walking ability when virtual reality was combined with RAGT [24]. Parents in our study also emphasized effective communication between the therapist and the child. Verbal encouragement was perceived as a key factor motivating children to increase walking speed and improve performance in video games [2,5]. Although RAGT reduces the physical burden on therapists, individualized adjustment of gait parameters remains essential. In the absence of standardized protocols, parameter selection relies heavily on clinical expertise, and continuous supervision with verbal reinforcement is required [1,3]. Improvements in children's self-confidence reported by parents in our study align with findings by Pool et al., who observed positive effects on emotional health and sleep quality in children at GMFCS levels IV–V [6]. Nevertheless, the intensity of RAGT may contribute to fatigue. In our study, 37.5% of parents reported tiredness during or after sessions, likely related to the intensive schedule of five sessions per week over four consecutive weeks. Fatigue has been infrequently reported in the literature, although expert recommendations suggest that discomfort during early sessions – often related to harness strap pressure – is common but typically transient [7]. These findings underscore the importance of careful attention to patient fixation and comfort during early sessions.

Parents also reported increased flexibility, reduced stiffness, and improved muscle strength and endurance, with particular emphasis on enhanced lower-limb motion (ROM). These findings are consistent with previous studies suggesting that RAGT may positively influence joint flexibility. Djuric et al. observed

improvements in ankle dorsiflexion, knee extension, and hip extension and abduction, although these changes did not reach statistical significance. Similarly, Žarković et al. reported increased hip extension and ankle dorsiflexion following a four-week RAGT program [25]. The use of elastic foot straps and harness during RAGT may facilitate stretching of spastic or tight muscles during the initial contact phase of the gait cycle, contributing to ROM gains. Although these changes may be small, they can still influence daily activities. Most parents also perceived a reduction in spasticity accompanied by improvements in muscle strength and endurance. However, evidence regarding the effects of RAGT on spasticity and muscle tone remains limited or inconclusive [26]. A systematic review and meta-analysis by Lim et al. highlighted the scarcity of direct measurements of muscle strength and spasticity in RAGT studies [27]. Žarković et al. demonstrated reductions in excessive hip internal rotation, improved ankle dorsiflexion, and decreased abnormal muscle activity using three-dimensional kinematics and electromyography [28]. These findings suggest that RAGT can induce measurable changes in joint motion and muscle activation, complementing parent-reported functional improvements.

Walking was consistently valued by parents as a central component of their child's well-being. Beveridge et al. similarly reported parent-perceived improvements in walking speed, endurance, balance, toe clearance, and step length [1]. RAGT enables correction of gait deviations common in CP and supports the acquisition of more physiological gait patterns, including heel strike [9,10]. In non-ambulatory children, RAGT facilitated stable standing and supported walking, while in ambulatory children it contributed to longer walking durations and improved endurance. In our cohort, more than half of the parents reported improvements in standing, walking, and overall motor function, whereas fewer than 10% expressed negative perceptions regarding standing time, posture, or motor activities. Notably, 20.8% of parents did not report improvements in walking endurance. Nearly one-third of the children in our study were wheelchair users (GMFCS level IV), whose capacity for sustained standing and walking is inherently limited. For these children, RAGT nonetheless enabled prolonged walking compare with their baseline abilities, which often consisted of only a few steps with adapted walkers or manual assistance. While numerous studies have documented positive effects of RAGT on motor function, balance, and gait in children with CP across GMFCS levels I–IV [10–13], fewer have examined how these improvements translate into activities of daily living. Most RAGT studies include follow-up periods of three

to six months. Sustained benefits were reported by Cherni et al. up to six months after 24 RAGT sessions [10], and by studies in adolescents and adults showed maintenance of gains for up to four months [18]. Although not objectively measured, parents in our study reported sustained improvements for up to two months following completion of RAGT sessions.

Quality of life (QOL) is increasingly recognized as a critical outcome in CP research [19]. QOL reflects individual well-being across multiple domains and has been defined as the “value that an individual assigns to the duration of life as modified by impairments, functional states, perceptions, and social opportunities influenced by disease, injury, treatment, or policy” [20]. Numerous factors influence QOL in CP, including demographic, clinical, neuropsychological, psychosocial, financial, educational, and healthcare-related aspects [21,29]. Therefore, a holistic approach that addresses both physical and emotional needs is essential [30]. Motor function is a key determinant of QOL [31,32], although greater impairment does not necessarily equate to lower perceived QOL [31]. Blasco et al. reported higher parent-rated QOL and greater satisfaction with RAGT compared with conventional therapy [21], findings that align with the positive participations of participation and well-being reported by parents in our study. Although QOL was not directly measured, indirect indicators such as energy expenditure and fatigue were included, and parents perceived improvements in these domains. Given the chronic and non-progressive nature of CP, substantial changes in QOL are unlikely after a short intervention period, perceived improvements may reflect meaningful functional and emotional benefits.

Only three parents responded to the optional open-ended questions. Content analysis revealed that

perceived benefits varies by GMFCS level: improvements in standing balance for children at level II, enhanced standing stability, longer walking with assistive devices, and reduced spasticity for level III, and increased motivation to walk, easier performance of daily activities, and improved mood for level IV. To our knowledge, such stratified qualitative observations have not been previously reported, limiting direct comparison with existing literature.

Conclusion

Most parents reported positive effects of robotic-assisted gait training on their child’s active participation, motivation, and self-esteem. Perceived improvements in muscle endurance, flexibility, and reduced stiffness facilitated daily activities such as dressing and diapering. Parents particularly valued improvements in standing posture, walking endurance, participation in daily life, and the presence of benefits in the months following treatment.

This study has several limitations, including a relatively small sample size and unequal distribution by sex, age, Gross Motor Function Classification System level, and cerebral palsy subtype. The absence of objective measures of activities of daily living limits the ability to triangulate parent-reported outcomes. Future studies should integrate parental perspective with objective assessments of activities of daily living, muscle strength, and gait to strengthen the evidence base. Parental feedback provides important insight into the real-world impact of robotic-assisted gait training; however, combining subjective and objective measures is essential to fully understand and substantiate its functional benefits in children with cerebral palsy.

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