

Telehealth-Delivered Occupational Performance Coaching for Children with Cerebral Palsy: Feasibility and Preliminary Outcomes from a Single-Case Pilot Study

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ABSTRACT

Objectives: Children with Cerebral Palsy (CP) frequently encounter motor limitations that restrict access to in-person rehabilitation services. This study examined the feasibility and preliminary consequences of Telehealth-Delivered Occupational Performance Coaching (Tele-OPC) in improving occupational performance, functional mobility, and parental anxiety.

Materials & Methods: A single-case experimental design was employed, involving five children (aged 3–6 years; GMFCS levels II–III) and their parents in an outpatient rehabilitation clinic in Tehran, Iran. Participants underwent a 12-week intervention consisting of weekly Tele-OPC sessions conducted via Google Meet. Outcomes were assessed using the Canadian Occupational Performance Measure (COPM), the Gross Motor Function Measure-88 (GMFM-88), and the Beck Anxiety Inventory (BAI) at baseline, intervention, and follow-up. Fidelity was monitored using the Occupational Performance Coaching-Fidelity Measure (OPC-FM). Data were analyzed using visual trend analysis and Cohen's *d* effect sizes.

Results: OPC-FM scores increased from 46.59 at session one to 69.23 at session twelve. All five participants achieved large improvements in occupational performance and satisfaction on the COPM, as well as in functional mobility on the GMFM-88, with effect sizes exceeding 2.67.

Four parents demonstrated a significant effect size in their anxiety levels, and one had a moderate improvement, with Cohen's *d* ranging from 0.87 up to 2.67. When you look at the graphs, the baseline levels stayed steady, and improvements stuck around even later. The PND analysis had mostly perfect non-overlap between different phases—almost 100%—except for one area (COPM satisfaction), where it was 67%.

Conclusion: Tele-OPC appears feasible and may improve occupational performance, mobility, and parental anxiety. More extensive studies with extended follow-up are recommended.

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Introduction

Cerebral Palsy (CP) is one of the most common motor disorders in childhood, with an incidence of 2–3 cases per 1,000 live births, resulting from non-

progressive damage to the developing central nervous system, leading to persistent motor and postural limitations that impair functional mobility (1). These physical restrictions significantly disrupt children's

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occupational performance across key life domains, including activities of daily living, play, education, social participation, and rest, ultimately limiting their engagement in meaningful roles (2). Occupational performance—a fundamental outcome in pediatric rehabilitation—represents the child's capacity to participate in everyday occupations and pursue personal objectives. Facilitating gains in this domain serves not only to strengthen the child's independence but also to improve overall family well-being and quality of life (2,3). Functional mobility, as a critical component of occupational performance, enables children to navigate their environments and participate actively in daily routines (4). These mobility-related limitations also place substantial emotional and practical demands on families.

Moreover, caring for a child with CP places considerable psychological strain on parents. Studies consistently report elevated levels of anxiety and depression among these parents compared to those of parents of typically developing children (5). Parental mental health is not merely a secondary concern; it directly shapes the quality of caregiving, therapy adherence, and child outcomes. Interventions grounded in family-centered principles have demonstrated positive effects on both child function and parental well-being (3).

Occupational Performance Coaching (OPC) is a family-centered approach integrating occupation-based therapy and disability empowerment frameworks (6), prioritizing parents' goals, using a top-down strategy, and targeting real-world participation as the primary outcome, aligning closely with CP rehabilitation objectives (7). The OPC process rests on three dynamic components: (1) building a trusting therapeutic relationship, (2) engaging in collaborative problem-solving to set and monitor functional goals, and (3) mutual knowledge-sharing to enhance parental self-efficacy and problem-solving in daily contexts (8). This structured and family-centered framework makes OPC particularly applicable for children with CP, whose needs are embedded in everyday routines. Evidence shows in-person OPC improves both children's occupational performance and parental mental health (9,10). Previous studies have implemented OPC with children with neurodevelopmental conditions, including CP and autism spectrum disorder, demonstrating improvements in participation, parental competence, and family well-being (9–12). However, face-to-face delivery remains inaccessible for many families, specifically during public health emergencies or in geographically remote settings.

Telerehabilitation has been proposed as an option to increase access and reduce travel challenges and costs

(13). Considerable research indicates the efficacy of telerehabilitation in providing motor and therapeutic interventions to children with CP in instances where mobility and transportation are problematic (14–16). Because OPC relies heavily on parent-led goal setting and problem-solving rather than hands-on therapist procedures, it is inherently suited to remote delivery. However, to the best of our knowledge, no study has adapted OPC to a telehealth format (Tele-OPC) in children with CP. Thus, the current study was designed to evaluate the feasibility of Tele-OPC and its preliminary impact on occupational performance, functional mobility, and parental anxiety in children with CP through a single-case experimental design (SCED). This would help to develop equitable tele-rehabilitation programs promoting participation, an essential goal of disability healthcare.

Materials & Methods

Study design

In this study, the Single-Case Experimental Design (SCED) method was adopted using the A-B-A format: the first A being the baseline, B as the intervention, and the second A as the follow-up. In each of the phases, there were three data collection periods, which took place one week apart. In the baseline phase, data stability was achieved without any intervention, while in the intervention phase, tele-OPC intervention sessions were done on a weekly basis and outcome measures collected. Follow-up phase took place two weeks after the intervention period (17). Setting and participants

Five children with CP and their primary caregivers were recruited from an outpatient rehabilitation clinic in Tehran (Chavan Rehabilitation Center), Iran. Inclusion criteria for children were: (1) diagnosis of CP; (2) age 3–6 years; (3) Gross Motor Function Classification System (GMFCS) levels I–III; (4) cognitive level > 70, assessed using the impairment form from the “Study of Participation of Children with Cerebral Palsy Living in Europe” (SPARKLE); (5) living in a family setting; (6) no orthopedic surgery in the past year or botulinum toxin injections in the past six months; (7) absence of severe comorbidities (e.g., cardiopulmonary disease, refractory seizures).

Parental inclusion criteria included (1) being the primary caregiver; (2) age 20–50 years; (3) literacy (ability to read and write); (4) access to a smartphone and stable internet; (5) informed consent; (6) Beck Anxiety Inventory (BAI) score < 26 (scores ≥ 26 indicate severe anxiety) (18). Exclusion criteria were child non-cooperation, initiation of new neurological/orthopedic treatments during the study,

insufficient parental proficiency in Persian to communicate effectively during the coaching sessions and understand the intervention instructions, or withdrawal from participation. Besides, caregivers confirmed that children did not initiate or modify any other therapeutic interventions during the study.

Intervention

Following the baseline phase, participants received 12-week Tele-OPC sessions, 45 minutes each, via

Google Meet, delivered by an occupational therapist trained in OPC through a review of key literature and manuals. The intervention protocol was guided by the OPC manual and foundational texts developed by Graham et al. (6, 8, 19). The intervention was grounded in three core OPC principles: emotional support, mutual information exchange, and structured problem-solving (8).

Table 1. Demographic characteristics of children with CP and their parents

Participant	Child's Age (years)	Child's Gender	Parent's Age	Parent's Gender	Parent's Education	Parent's Occupation	GMFCS Level
1	3	Male	33	Female	Bachelor's degree	Homemaker	3
2	6	Male	39	Female	Bachelor's degree	Homemaker	3
3	6	Male	50	Female	Bachelor's degree	Teacher	2
4	4	Female	41	Female	High school diploma	Homemaker	2
5	5	Male	45	Male	High school diploma	Self-employed	3

Table 2. OPC-FM scores across the 12 Tele-OPC sessions

Session	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Mean
1	48.89	46.47	53.33	37.78	46.47	46.59
2	51.30	48.23	52.59	40.18	47.31	47.92
3	53.70	50.00	51.85	42.59	48.14	49.26
4	56.48	53.70	55.55	45.37	49.07	52.03
5	59.25	51.85	59.26	48.15	50.00	53.70
6	53.70	55.55	61.11	50.93	52.78	54.81
7	56.48	59.26	62.96	53.70	55.55	57.59
8	60.64	63.89	64.81	52.32	59.26	60.18
9	64.81	68.59	66.67	56.72	62.96	63.95
10	66.67	66.24	65.74	58.91	61.20	63.75
11	66.20	68.52	68.05	61.11	67.63	66.30
12	65.74	67.38	70.37	68.59	74.07	69.23

Note. OPC-FM = Occupational Performance Coaching-Fidelity Measure. Values represent participant scores after each Tele-OPC session; mean scores were calculated across the five participants.

Table 3. COPM performance scores across baseline, intervention, and follow-up phases

Participant	Baseline		Intervention		Follow-up		
	Mean	SD	Mean	SD	Mean	SD	ES
1	4	0.33	6	0.67	7	0.33	6.06
2	3	0.33	5	0.67	6	0.33	6.06
3	3	0.67	5.33	0.34	6	0.33	3.48
4	6.33	0.34	8.33	0.00	8.67	0.34	5.96
5	4.67	0.34	6	0.33	6.33	0.34	3.98

Note. Values represent mean scores for each phase. Effect sizes were calculated using Cohen's d. Assessments were conducted at study weeks 1, 2, and 3 during baseline; weeks 7, 11, and 15 during intervention; and weeks 17, 18, and 19 during follow-up. Individual scores are shown in Figure 1.

Active listening, empathic reflection, and reframing were used to give validation and encourage engagement. Information exchange was done in two ways: parents giving information about problems that the child has and information from the therapist that

provides scientifically based information that makes parents knowledgeable and able to respond appropriately. Problem-solving was done through six steps: (1) identifying parent-selected goals, (2) coming up with alternatives, (3) planning action plans, (4)

implementation of strategies at home, (5) weekly review of process, and (6) generalization of successful strategies to other contexts (8). Intervention fidelity was monitored weekly using the Occupational Performance Coaching-Fidelity Measure (OPC-FM), an 18-item checklist (14 therapist items, 4 client items)

completed by the therapist to enhance session quality (19).

Three outcome assessments (COPM, GMFM-88, and BAI) were done three times during the baseline period, prior to the start of the intervention, after interventions 4, 8, and 12, and three weeks into the follow-up.

Table 4. COPM satisfaction scores across baseline, intervention, and follow-up phases

Participant	Baseline		Intervention		Follow-up		
	Mean	SD	Mean	SD	Mean	SD	ES
1	3.67	0.34	5.33	0.34	6	0.33	4.97
2	2.33	0.34	5.33	0.34	5.67	0.34	8.95
3	2.33	0.34	5.33	0.34	6	0.67	8.95
4	6.33	0.34	8.67	0.34	9	0.33	6.96
5	5.33	0.34	6.33	0.34	6	0.33	2.98

Note. SD = standard deviation; ES = effect size; Satisfaction scores reflect caregivers' satisfaction with the child's performance.

Assessments were conducted at study weeks 1, 2, and 3 during baseline; weeks 7, 11, and 15 during intervention; and weeks 17, 18, and 19 during follow-up. Individual scores are shown in Figure 2.

Table 5. GMFM-88 functional mobility scores across baseline, intervention, and follow-up phases

Participant	Baseline		Intervention		Follow-up		
	Mean	SD	Mean	SD	Mean	SD	ES
1	79.67	0.70	86.99	0.02	86.39	0.14	10.42
2	77.33	1.68	82.50	0.30	87.33	0.59	3.08
3	90.14	0.81	94.87	0.78	93.80	0.27	5.87
4	94.55	0.76	98.33	0.28	98.79	0.16	4.94
5	85.46	0.56	88.64	0.43	88.64	0.16	5.68

Note. Values represent mean scores for each phase. Effect sizes were calculated using Cohen's d. Assessments were conducted at study weeks 1, 2, and 3 during baseline; weeks 7, 11, and 15 during intervention; and weeks 17, 18, and 19 during follow-up. Individual scores are shown in Figure 3.

Table 6. Parental Anxiety Scores (BAI) across baseline, intervention, and follow-up phases

Participant	Baseline		Intervention		Follow-up		
	Mean	SD	Mean	SD	Mean	SD	ES
1	15	1	11	1	13	1	4
2	22.67	2.52	18	1	19	1	1.85
3	21	1	15	1	17	1	6
4	24	1	20	1	18	2	4
5	18	2	11	1	9	2	3.50

Note. Values represent mean scores for each phase. Effect sizes were calculated using Cohen's d. Assessments were conducted at study weeks 1, 2, and 3 during baseline; weeks 7, 11, and 15 during intervention; and weeks 17, 18, and 19 during follow-up. Individual scores are shown in Figure 4.

Outcome measures

Canadian Occupational Performance Measure (COPM): Assessed parental perception of child performance and satisfaction in self-care, productivity, and leisure (scale 1–10). The Persian version demonstrates strong validity and reliability (content validity = 80.95 ± 0.22 ; test-retest reliability: $r = 0.84$ for performance and $r = 0.87$ for satisfaction) (20). Satisfaction ratings reflected the caregiver's satisfaction with the child's performance, not the child's self-evaluation.

Gross Motor Function Measure-88 (GMFM-88): Evaluated functional mobility across five domains (88 items). The Persian version shows excellent intra- and inter-rater reliability (ICC = 0.99) and internal consistency (Cronbach's $\alpha = 0.78$ – 0.94) (21). The

GMFM-88 was included as a secondary exploratory outcome to examine whether changes in functional mobility accompanied changes in participation-oriented and parent-identified occupational goals. Because Tele-OPC is not a direct motor-training intervention, GMFM findings were interpreted cautiously. Because Tele-OPC is not a direct motor-training intervention, GMFM findings were interpreted cautiously.

Beck Anxiety Inventory (BAI): Measured parental anxiety (21 items; total score 0–63). Severity ranges: 0–7 (minimal), 8–15 (mild), 16–25 (moderate), 26–63 (severe). The Persian version has good validity ($r = 0.72$) and reliability ($r = 0.83$) (18).

Occupational Performance Coaching-Fidelity Measure (OPC-FM): To track fidelity to Tele-OPC

and encourage clinician self-reflection, the treating therapist completed the OPC-FM—an 18-item

checklist grounded in the core principles of OPC—after every session. (19).

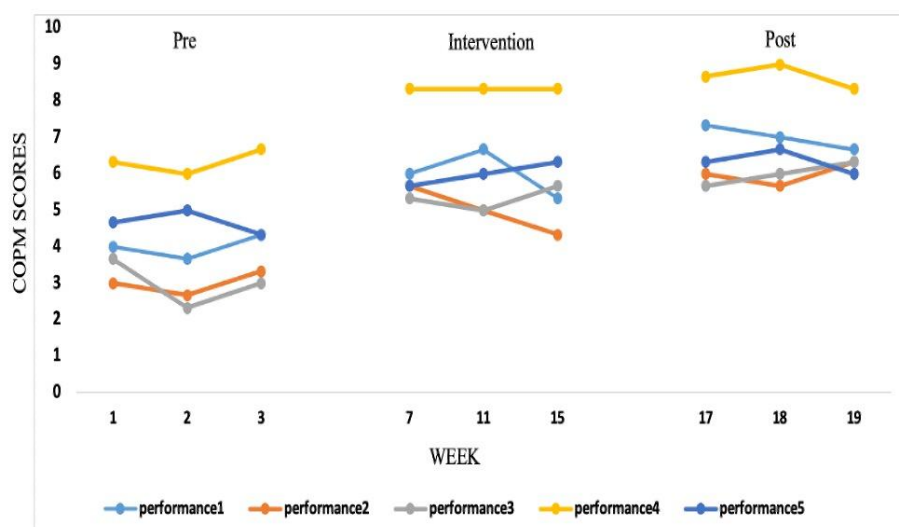


Figure 1. COPM performance scores across baseline (pre), intervention, and follow-up (post) phases

Individual participant COPM performance scores are plotted across baseline (pre), intervention, and follow-up (post) phases.

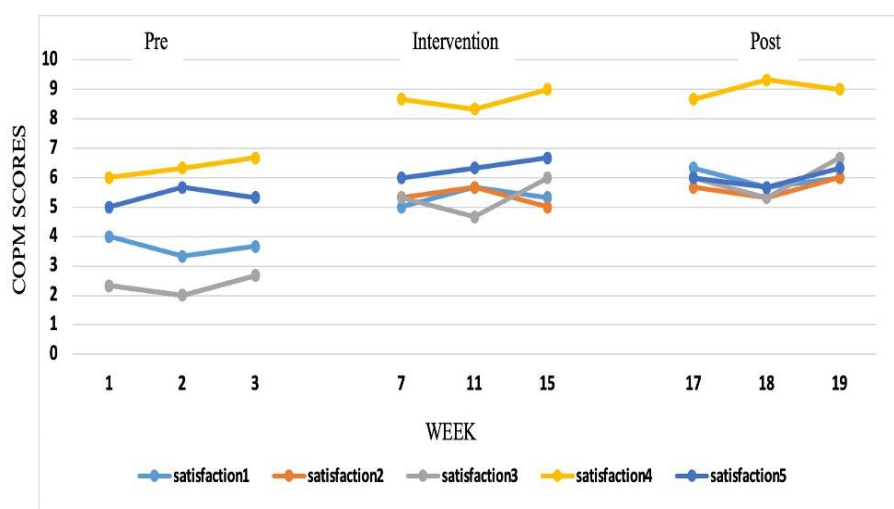


Figure 2. COPM satisfaction scores across baseline (pre), intervention, and follow-up (post) phases

Individual participant COPM satisfaction scores across baseline (pre), intervention, and follow-up (post) phases. During the baseline phase, the scores of Participants 2 and 3 were identical, and their trajectories therefore overlap.

Data analysis

Data were analyzed per SCED standards (17). For each participant, means and standard deviations were calculated across baseline, intervention, and follow-up phases for all outcomes. Cohen's *d* effect sizes were computed in R (v4.3.3) using phase means and pooled standard deviations (22). Effect size interpretation: < 0.87 = small; 0.87 – 2.67 = moderate; > 2.67 = large. Visual analysis of line graphs (plotting all assessment points) assessed trend, level, and stability across phases

(17). Visual analysis considered changes in level, trend, variability, immediacy of effect, and overlap between phases, following SCED reporting guidelines. Percentage of Non-Overlapping Data (PND) was also calculated as a supplementary index of intervention effectiveness. PND values above 90% were interpreted as very effective, values between 70% and 90% as effective, values between 50% and 70% as questionable, and values below 50% as ineffective (17).

Results

Participants and study flow

Five children (GMFCS II–III, mean age 4.8 years) and their parents (mean age 41.6 years) participated in the study, and all completed the intervention and assessments. In the baseline and follow-up phases, three measurements were conducted at one-week intervals. In contrast, during the intervention phase, measurements were conducted after sessions 4, 8, and

12 (weeks 1, 2, 3, 7, 11, 15, 17, 18, and 19 from study onset). A one-week interval separated the baseline and intervention phases, after which 12 weekly Tele-OPC sessions were delivered. Following a two-week break, the follow-up phase commenced, and the study concluded in week 19. On average, three of the 12 intervention sessions were rescheduled per participant due to internet connectivity issues (slow speed or outages). Nevertheless, all required data were collected as planned. Demographic characteristics of participants are depicted in Table 1.

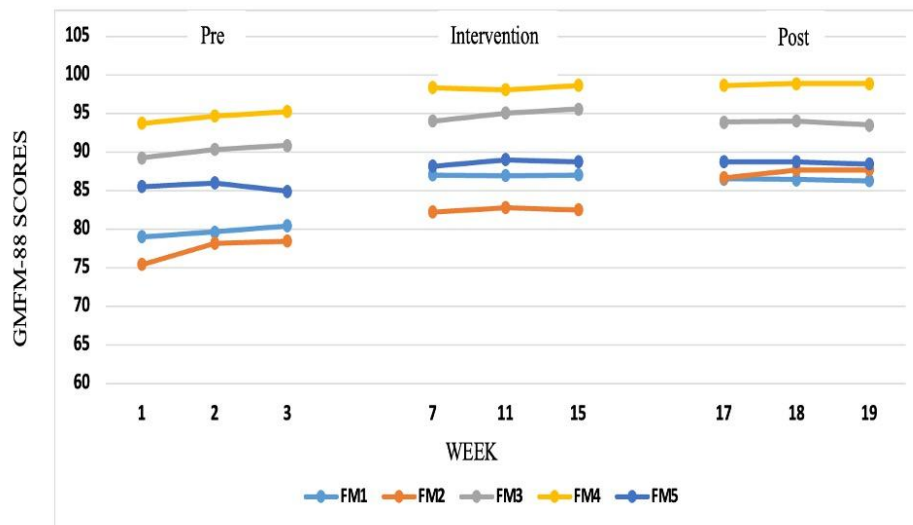


Figure 3. Functional mobility (GMFM-88) scores across baseline (pre), intervention, and follow-up (post) phases. Individual participant GMFM-88 scores illustrating functional mobility changes across study phases.

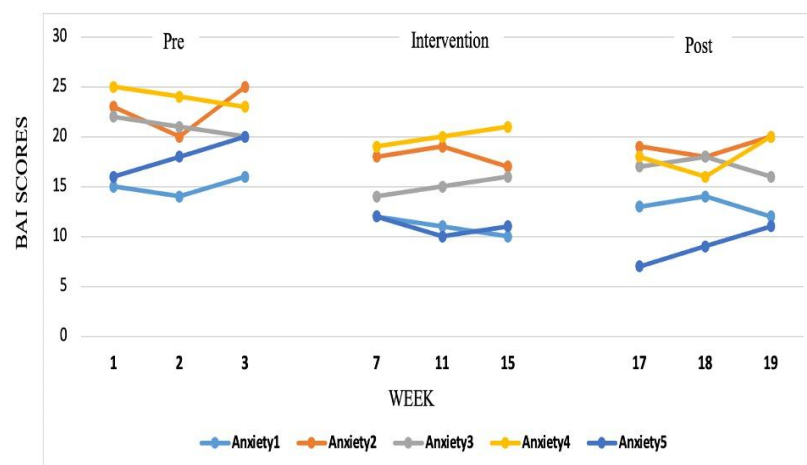


Figure 4. Parental Anxiety (BAI) scores across baseline (pre), intervention, and follow-up (post) phases. Individual parent Beck Anxiety Inventory (BAI) scores plotted across baseline, intervention, and follow-up phases.

Intervention fidelity (OPC-FM)

After each session, the Occupational Performance Coaching–Fidelity Measure (OPC-FM) checklist was completed by the therapist for each participant. The session-by-session OPC-FM scores for all five

participants and the mean score for each session are illustrated in Table 2. Mean OPC-FM scores showed an overall increase from 46.59 in session 1 to 69.23 in session 12, indicating a progressive improvement in intervention fidelity over time.

Occupational performance and satisfaction (COPM)

For each participant, three goals (15 goals in total) were identified using the COPM and targeted during intervention sessions. All selected goals were relevant to the children, and performance and satisfaction ratings for each goal were reported by parents. Of the 15 goals, six related to self-care, five to productivity, and four to leisure.

Following 12 intervention sessions, mean COPM performance scores increased from 4.2 to 6.1, representing a 45% improvement. This change was clinically meaningful, as four of the five participants demonstrated increases of two points or more—the threshold for clinical significance on the COPM (23). Although participant 5 did not reach the two-point threshold, a large effect size ($ES = 3.98$) was observed. Satisfaction scores also increased from a mean of 3.9 to 6.1. Four participants showed clinically meaningful improvements (≥ 2 points), while participant 1 demonstrated a smaller numerical change (1.66 points) with a large effect size ($ES = 4.97$).

During follow-up, mean changes did not reach the two-point threshold for clinical significance. However, performance and satisfaction scores were largely maintained relative to post-intervention values (Tables 3 and 4).

Functional mobility (GMFM-88)

Based on GMFM-88 data, mean functional mobility at baseline was 85.4. Given that participants' GMFCS levels were II–III, baseline mobility scores were relatively high. During the intervention phase, mean scores increased to 90.2. Despite this 5.6% improvement, only one participant demonstrated further improvement during follow-up. Effect sizes for all participants exceeded 2.67, indicating large effects (Table 5).

Parental anxiety (BAI)

At baseline, one parent was classified within the mild anxiety range and four within the moderate range. Following intervention, two parents moved from moderate to mild anxiety classifications. In the remaining three parents, anxiety scores decreased but classification levels remained unchanged. During follow-up, anxiety scores increased for two parents and decreased for two parents without changes in classification. One parent returned to the moderate anxiety range after improvement during intervention. Effect sizes ranged from 1.85 to 6; four parents demonstrated large effects (> 2.67), and one showed a moderate effect (Table 6).

Visual analysis

Observations on the basis of visual assessment of the graphs revealed that stability was maintained for all variables during the baseline phase. Once the intervention phase commenced, some changes were noticed in each variable. Both performance and satisfaction scores on COPM scale revealed an overall increasing trend for all participants (Figures 1 & 2). Scores on functional mobility showed improvement with varying amounts of change in different participants (Figure 3). Anxiety scores of parents revealed overall reduction during the intervention phase with variability during follow-up period (Figure 4).

PND analysis confirmed the observations made from visual assessment. In most cases, PND values reached 100%, which implies that the overlap of data points analyzed was completely absent indicating very effective intervention effects based on the conventional guidelines. However, the only exception was the COPM satisfaction score of Participant 5, which revealed a PND value of 67%.

Discussion

The present pilot study evaluated the feasibility of implementing Occupational Performance Coaching using telehealth (Tele-OPC) for children diagnosed with cerebral palsy. In general, the results of this study indicate that Tele-OPC is feasible and could help in achieving progress in children's occupational performance, functional mobility, and parents' anxiety. Thus, this pilot study extends current scientific knowledge related to in-person OPC by indicating that its essential features can be adapted to the telehealth framework. As far as feasibility and fidelity findings are concerned, their results, manifesting themselves in increased OPC-FM scores in each subsequent session, demonstrate that both therapists and parents succeeded in progressively engaging in Tele-OPC sessions. Establishing a therapeutic relationship is one of the key elements of OPC (24). However, some concerns exist regarding the possibility of establishing therapeutic alliances in telehealth settings (25). Fidelity improvement found in this study indicates that therapeutic alliance and adherence to OPC principles can be maintained through progressive engagement in telehealth-based coaching. Previous OPC-related studies, including those conducted by Jamali et al. (11), confirm the feasibility of this strategy. Clinically significant improvements in COPM performance and satisfaction were observed for most participants. Such findings are congruent with past studies revealing the effectiveness of OPC in improving goal-oriented occupational performance and caregiver satisfaction in

both children and adults (11, 26-28). The involvement of the parents in goal setting and problem solving may have aided in achieving these results due to the consistency and relevance of the methods used in everyday life. Although the access advantages of telehealth, such as reduced need for travel, may have facilitated attendance (29), this was not directly measured. Changes in functional mobility assessed by the GMFM-88 occurred in the intervention period, with a large effect size across participants. While the OPC model does not aim at improving physical abilities, changes in functional mobility could indicate increased possibilities for practicing mobility skills through meaningful everyday activities rather than explicit motor skills training. Changes in motor abilities have also been noted in coaching interventions (30). Variability in outcomes after follow-up periods indicates the complexity of sustaining functional improvements and the impact of context on functional development, which has already been demonstrated in earlier tele-rehabilitation research (31). Reductions in parental anxiety following the intervention suggest potential psychosocial benefits of Tele-OPC. Strengthening caregiver confidence, problem-solving skills, and perceived support may contribute to improved psychological well-being, consistent with previous OPC research (9,12, 26). The increase in anxiety observed in one parent during follow-up may reflect individual differences in coping or the need for ongoing support, indicating that continued support or complementary interventions could be beneficial for some families (9).

In Conclusion

This research provides preliminary results indicating that Tele-OPC can be used as a feasible family-centered treatment method for children who have CP. It can be concluded from the study results that delivery of OPC through telehealth can positively influence occupational performance and functional mobility, and reduce parental anxiety levels. More research is required to validate this conclusion.

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Study limitations

A number of limitations have to be mentioned. Technical issues regarding internet connection problems sometimes interfered with the process and might have affected the intervention delivery. The fidelity of the intervention was measured by the treating therapist and therefore could have been biased. Thus, independent assessors have to be used in further research. The limited number of participants and lack of a control group make the study non-generalizable, while the short follow-up period did not allow assessment of any possible long-term effects.

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Author's Contribution

Conceptualization: Zahra Morovati, Saeid Fatorehchy; Methodology: Zahra Morovati, Saeid Fatorehchy, Ebrahim Pishyareh, Mina Ahmadi Kahjoogh; Intervention Implementation: Zahra Morovati; Formal Analysis: Akbar Biglarian, Zahra Morovati; Writing - Original Draft: Zahra Morovati; Writing - Review & Editing: Saeid Fatorehchy, Ebrahim Pishyareh, Seyed Ali Hosseini, Farin Soleimani, Mina Ahmadi Kahjoogh; All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare that they have no conflicts of interest to disclose.

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