

The effects of Family-Centred Functional Therapy on the occupational performance of children with cerebral palsy

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Key words

- Paediatric occupational therapy
- Family centred care
- Evaluation research

Abstract

Background. Family-Centred Functional Therapy (FCFT) is a comprehensive approach to paediatric occupational therapy that considers and addresses the skills of the child, the requirements of functional tasks and the elements within the tasks environment, including family goals and preferences. **Purpose.** The purpose of the present study was to determine if interventions based on FCFT, but limited to addressing elements of the task and environment, would improve task performance. **Method.** A single subject, multiple baseline design was applied to three children, for three tasks each. Tasks were selected by parents and measured during baseline and intervention phases. **Results.** Results indicate that for each child at least one of the two tasks for which intervention was provided demonstrated improved performance. Parents reported a clinically significant improvement in satisfaction with their children's performance in the tasks that were addressed. **Practice Implications.** This study provides preliminary evidence of the effectiveness of the FCFT approach.

Résumé

Description générale. La thérapie fonctionnelle centrée sur la famille (TFCF) est une approche globale de l'ergothérapie en pédiatrie qui évalue et traite les habiletés de l'enfant, tout en tenant compte des exigences des tâches fonctionnelles et des éléments environnementaux associés à la tâche, dont les objectifs et les préférences de la famille. **But.** Le but de la présente étude était de déterminer si les interventions en TFCF se limitant au traitement des éléments de la tâche et de l'environnement pouvaient améliorer l'exécution de la tâche. **Méthodologie.** Une étude préliminaire multiple à sujet unique a été effectuée auprès de trois enfants, ayant chacun trois tâches à accomplir. Les tâches ont été sélectionnées par les parents et mesurées pendant les étapes préliminaires et pendant l'intervention. **Résultats.** Les résultats indiquent que le rendement de chaque enfant s'était amélioré dans l'exécution d'au moins l'une des deux tâches ayant fait l'objet d'une intervention. Les parents ont indiqué une amélioration significative du rendement de leur enfant dans les tâches ayant fait l'objet d'une intervention. **Conséquences pour la pratique.** Cette étude fournit des données probantes préliminaires sur l'efficacité de la TFCF.

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Cerebral palsy is a common cause of disability among children (Liptak et al., 2001). The prevalence of cerebral palsy has remained static over the past 40 years and averages 2-2.5/1000 children in the Western world (Boyle, Decoufle, & Yeargin Allsopp, 1994; Boyle et al., 1996; Grether, Cummins, & Nelson, 1992; Murphy, Yeargin Allsopp, Decoufle, & Drews, 1993; Robertson, Svenson, & Joffres, 1998). A recent review of the literature indicates that the prevalence of cerebral palsy remains stable despite improvements in obstetrics (Missiuna, Smits, Rosenbaum, Woodside, & Law, 2001). The lack of change in the prevalence rate for cerebral palsy appears to result from an increased survival rate of low birth weight, pre-term babies (Missiuna et al., 2001).

Current approaches to intervention for children with cerebral palsy have emerged from a variety of sources, including neuromaturational, pharmacological, biomechanical and surgical frames of reference. Regular therapeutic intervention, including both physical and occupational therapy, is common for young children with cerebral palsy (*CanChild* Centre for Childhood Disability Research, 2000; Case-Smith, Allen, & Pratt, 1996). In occupational therapy, neurodevelopmental therapy (NDT), proprioceptive neuromuscular facilitation (PNF), movement therapy, muscle re-education and the Vojta approach are clinical models which are based on a neuromaturational foundation (McCull, Law, & Stewart, 1993). Other approaches used in conjunction with these include medications such as botulinum toxin injections, dantrolene sodium and baclofen (Binder & Eng, 1989). Casting is based on a biomechanical approach (Law, Cadman et al., 1991) and surgical approaches include tendon release and selective dorsal rhizotomy (Wright, Sheil, Drake, Wedge, & Naumann, 1998).

These current approaches are similar in that they target the physical constraints or impairments of the children with cerebral palsy and do not directly address the functional tasks or the environment in which the tasks are being performed. The research results of the effectiveness of current therapies are fairly equivocal (Adams, Chandler, & Schulmann, 2000; Ade-Hall & Moore, 2001; Bower, 1994; Brouwer et al., 1998; Butler & Darrah, 2001; Corry et al., 1998; DeGangi, 1994; Fetters & Kluzik, 1996; Flett et al., 1999; Herndon, Troup, Yngve & Sullivan, 1987; Koman, Mooney, Smith, Goodman & Mulvaney, 1993; Law et al., 1991; Law et al., 1997; McLaughlin et al., 1998; Palmer et al., 1988; Steinbok et al., 1997; Teplicky, Law, & Russell, 2002; Trahan & Malouin, 1999; Watt et al., 1986; Wright et al., 1998). Therefore, investigation of adjunct therapies, that target other areas that influence occupational performance, is indicated.

Family-Centred Functional Therapy (FCFT)

Family-Centred Functional Therapy (FCFT) is an emerging clinical model for children with cerebral palsy that addresses more than the individual capacities of the child (Law, Darrah et al., 1998). FCFT broadens the intervention to encompass the child's environment and the functional goals of the child and family, as well as the physical abilities of the child. The concepts and theoretical foundation of FCFT reflect trends in the provision of health care to children and in theoretical approaches in occupational therapy (Darrah et al., 2001; Law, Darrah et al., 1998). Family-centred service (FCS) and the dynamic systems theory of motor development are the primary theoretical foundations of FCFT (Darrah et al., 2001; Law, Darrah et al., 1998). Concepts from occupational therapy, the interaction between the person, the environment and the task and the promotion of task performance through therapy have influenced the development of the FCFT approach (Darrah et al., 2001).

The principles underlying the FCFT approach include: (a) promotion of functional performance during intervention; (b) identification of periods of change or transition as the best time to promote the acquisition of a new skill; (c) identification of the primary constraints in the environment, the task and/or the child that prevent task achievement; (d) intervention to change these constraints and improve task performance; and (e) the provision of opportunities to practice in a functional context (Darrah et al., 2001). The desired outcome of FCFT is the successful achievement of a functional task identified by the family as important to the child (Darrah et al., 2001). Therefore, adaptations are encouraged and effective movement patterns are considered more important than normal movement patterns.

The parents and the child are involved in identifying the therapeutic goals and practising the tasks related to these goals at home. The goals are functional in nature and the intervention is constructed to fit into the family routine. The therapist focuses on promoting skill acquisition, adapting the environment and the task, and eliminating constraints experienced by the child and the family in achieving task performance. Constraints to performance may exist in the environment, the task and/or the child and all three aspects can be addressed through intervention.

Family-Centred Service (FCS)

The approach the therapist uses in the FCFT model to interact with the family and identify goals for the child is reflective of FCS principles. Intervention is provided in the

home and parents are educated in the provision of intervention, therefore providing the child with a stable environment. The stable environment increases the likelihood that the child's occupational performance will be maximized. The family is involved in the intervention plan by providing unique information about the child and their preferences for the direction of therapy. The family also receives education services and information to support stability and reduce their stress (Johns & Harvey, 1993; King, Rosenbaum, Law, King, & Evans, 1996; Law, Darrach et al., 1998; Shelton & Stepanek, 1994). The therapist aims to develop intervention plans that motivate the child and satisfy the family. FCS is inherent to the FCFT approach and is reflected in the identification of functional goals by the parent, the parent involvement in intervention and the provision of opportunities for the child to practice tasks in a functional environment.

In a conceptual model of FCS, King et al. (1996) have identified 19 elements of the FCS approach which guide the behaviour of health care professionals. A review of research about these elements found that there is substantial evidence supporting the effectiveness of the majority of the elements (Rosenbaum, King, Law, King, & Evans, 1998). Although the quality of the research varies, the consistency of the positive outcomes supports the use of the FCS approach.

Dynamic Systems Theory of Motor Development (DST)

DST is an important theoretical foundation of FCFT and is reflected in the FCFT principles targeting skill acquisition. DST provides an explanation for motor development that is gaining increasing attention (Darrach et al., 2001). While neuromaturational theory is the predominant theory of motor development used clinically, current research is challenging this approach (DeGangi & Royeen, 1991; Law, Darrach et al., 1998).

The DST asserts that the CNS does not drive motor development but that it is one subsystem among many which are working in coordination to promote development (Darrach & Bartlett, 1995; Hay, 1997; Heriza, 1991; Horak, 1992; Mathiowetz & Bass Haugen, 1994; McLoughlin Gray, Kennedy, & Zemke, 1993; Thelen, Kelso, & Fogel, 1987). The intervention approach based in the DST provides flexibility for the child's motor development and use of physical abilities versus developing the child's motor skills in a sequential fashion and changing the motor output to reflect a normal pattern. With the DST theory "[a]t every stage of development, movement is assembled with whatever subsystems are maturationally available with respect to the particular environment and task-specific context" (Heriza, 1991, p. 56). The child is encouraged to

use the abilities he or she has to achieve a functional outcome and it is more important for the child to achieve the outcome than how it is achieved.

Evidence suggests that these theoretical foundations, FCS and DST, may be effective in improving functional performance and parent satisfaction. Further investigation of the FCFT approach is warranted due to the relevance and importance of its theoretical foundation and concepts.

To date, there have been four studies of FCFT (Law, Darrach et al., 1998) and one study applying aspects of DST (Katelaar, Vermeer, Hart, van Petegem-van Beek, & Helders, 2001).

The results of the FCFT studies found that the principles of the FCFT were feasible in a clinical setting and that therapists tended to identify and focus on constraints within the child, such as muscle tone, which may be difficult to change (Law, Darrach et al., 1998; Darrach et al., 2001). Therapists also reported that NDT is the primary form of intervention, despite the lack of supporting evidence (Law, Darrach et al., 1998). The results of the study of functional physical therapy support the use of functional therapy and the further application and study of DST in intervention (Katelaar, Vermeer, Hart, van Petegem-van Beek, & Helders, 2001). The evidence from these five studies warrants further investigation of the FCFT approach.

The purpose of the present study was to determine if occupational therapy intervention, using modified FCFT, focused on changing only the task and the environment, could improve the functional performance of preschool aged children with cerebral palsy.

The research question was: 'Do changes in the environment and/or the task improve the performance of functional tasks, which are identified to be in transition, in preschool-aged children with cerebral palsy?'

Method Design

The study used a multiple baseline across tasks design in which data were simultaneously collected for three tasks with intervention being provided in a staged manner for two of the tasks. The third task was monitored for changes in performance but no intervention was provided.

Study sample

The sample size for this research project was originally set as a single case with three replications, for a total of four participants. One participant withdrew during the study due to illness, so the final sample was three participants.

Eligible children were identified from the caseloads of two occupational therapists at a paediatric rehabilitation centre. Children were eligible for study enrolment if they

were aged 3 years, 0 months to 5 years, 11 months, had received a diagnosis of cerebral palsy from a physician and were rated at the functional level of III on the Gross Motor Function Classification System (GMFCS) (Palisano et al., 1997).

Participant 1 was a boy aged 3 years, 6 months, Participant 2 was a girl aged 3 years, 6 months and Participant 3 was a boy age 3 years, 0 months. The children all lived in two-parent homes in a major urban centre. Informed consent was obtained from the parents prior to the beginning of the study.

Outcome Measures

Canadian Occupational Performance Measure (COPM)

The COPM uses a semi-structured interview format to identify tasks which are important to participants and then to rate the performance and satisfaction of the tasks which are a priority (Law, Baptiste et al., 1998). The test-retest reliability of the COPM is .79 (ICC) for the performance scale and .75 for the satisfaction scale when the COPM is completed by parents of children with disabilities (Law & Stewart, 1996). The COPM was used effectively with families in a study by Pollock and Stewart (1998) to identify top priority problems. The construct and criterion validity of the COPM were supported when its scores were related to those of assessments that measure theoretically related constructs (McCull, Paterson, Davies, Doubt, & Law, 2000).

The COPM was used in this study to identify three tasks in transition. To do this, during the initial assessment the parents were asked to choose tasks that the children were motivated to perform but in which they were experiencing difficulty due to their impairments. Motivation to perform a task is a strong indication that it is in transition (Darrach & Bartlett, 1995; Horak, 1991; Kelso & Tuller, 1984; Mathiowetz & Bass Haugen, 1994). The advantage of using the parents to identify tasks in transition was that they have a thorough understanding of the context in which the child must function (Cohn, Miller & Tickle-Degnen, 2000). In this study, parents completed the performance and satisfaction scales of the COPM for these tasks at the initial and follow-up assessments. The performance scale was also used throughout the study by the parents to rate their daily observations of performance of the three tasks. Each COPM scale ranges from one to ten. For performance, a score of one means the individual is completely unable to do a task and a score of ten means he or she is able to do it extremely well. For the satisfaction scale, one denotes that the person is not at all satisfied with their performance of the task and ten means the person is extremely satisfied with the performance.

Paediatric Evaluation of Disability Inventory (PEDI)

The PEDI evaluates a child's performance of functional skills as well as caregiver assistance and modifications. It is administered as either a structured interview with parents or completed by professional judgement (Knox & Usen, 2000). In this study, the PEDI was administered by the primary author as a structured interview with the caregiver during the initial and follow-up assessments.

Intraclass correlations for the PEDI range between .96-.98 for inter-rater reliability and internal consistency has been reported as .95-.99 (Haley, 1997). Both content and criterion validity have been rated as excellent and the PEDI has evidence of responsiveness (Knox & Usen, 2000, Nichols & Case-Smith, 1996).

The PEDI includes three sets of measurement scales: (1) Functional Skills, (2) Caregiver Assistance, and (3) Modifications (Haley, Coster, Ludlow, Haltiwanger, & Andrellos, 1992). Only the Caregiver Assistance Scale was used in this study as it measures the level of independence of the child by the level of assistance provided by the caregiver as opposed to measuring the components of these activities. The PEDI was administered to provide further evidence of change in the targeted tasks.

Performance Quality Rating Scale (PQRS)

The Performance Quality Rating Scale (PQRS) is designed to measure level of achievement for task performance and the quality of performance (Martini, 1994). Using the PQRS, three components of the performance of a specific task are rated. The first component is the achievement of task criteria, a list of steps required to achieve that task determined prior to the evaluation. The lists of steps for the tasks in this study were developed by the primary author using task analysis and were confirmed by a paediatric clinician. To score, the evaluator chooses the step the child has performed during the observation. The second component of the PQRS is an evaluation of the quality of performance of the step. Quality of performance is rated as poor, fair or good. The third component of the PQRS involves assigning an overall performance score for the child's performance, using a six point scale from zero to five. Zero reflects a performance in which no activity criteria are accomplished and five reflects performance in which all activity criteria are performed with good quality. The reliability of the PQRS is .78 for the task criteria rating, .89 for criterion performance quality rating and .72 for the overall performance rating (Martini, 1994).

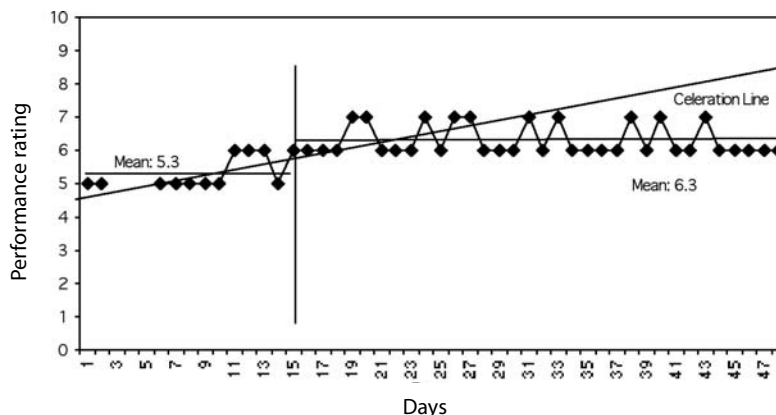
A paediatric clinician, unaware of the study purpose and methods, evaluated the videotaped pre- and post-

FIGURE 1

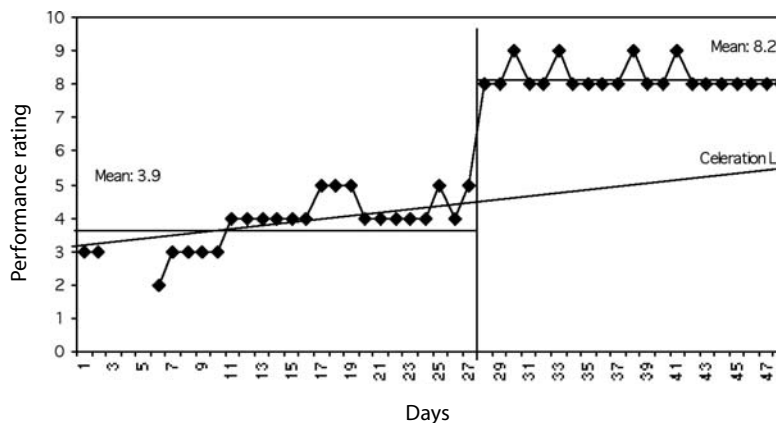
Line graphs representing the daily performance ratings of the three task performances completed by the parents for Child 1.

Child 1

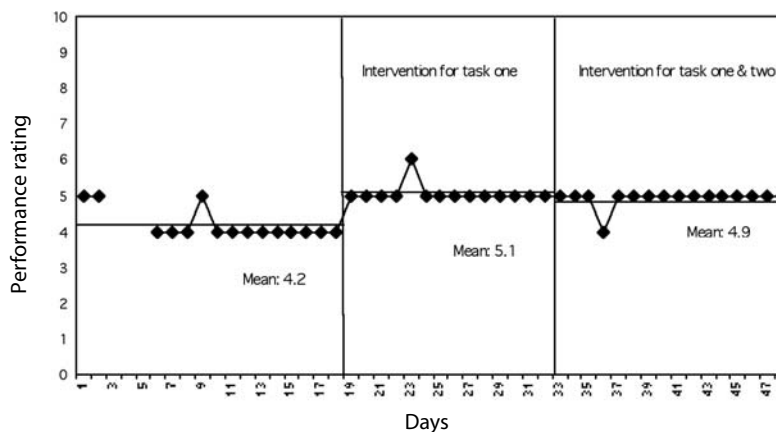
Task 1
Donning pants



Task 2
Self-feeding



Task 3
Donning shoes



intervention performances of the children using the PQRS. The clinician evaluated the videotaped performances of the tasks in a random order to minimize rater drift.

Data collection

Two sessions were completed with the parents at their home prior to the start of intervention. At the first session, a demographic questionnaire, the COPM and the PEDI

were administered by the primary author. At the second pre-intervention session, the child's performance of the three tasks identified by the parent was videotaped.

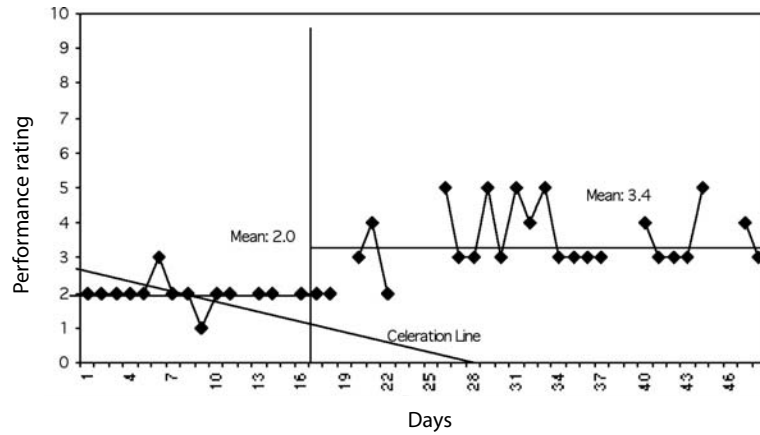
The purpose of videotaping was to assist the development of the intervention strategies and for scoring of performance using the PQRS. A parent recorded the daily performance of their children for the three tasks using the performance scale of the COPM throughout the baseline

FIGURE 2

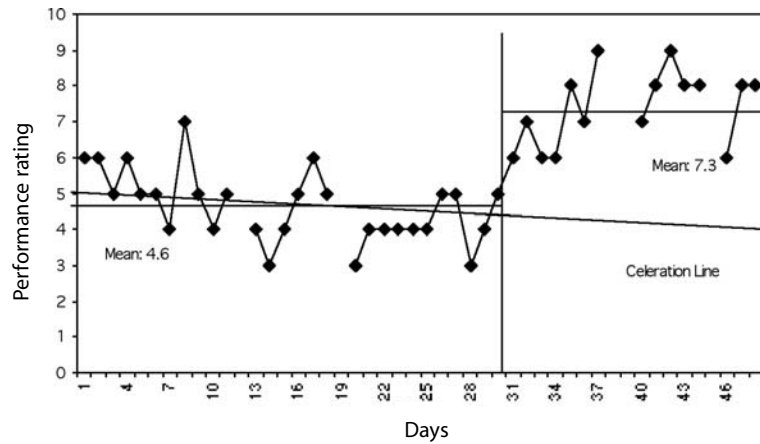
Line graphs representing the daily performance ratings of the three task performances completed by the parents for Child 2.

Child 2

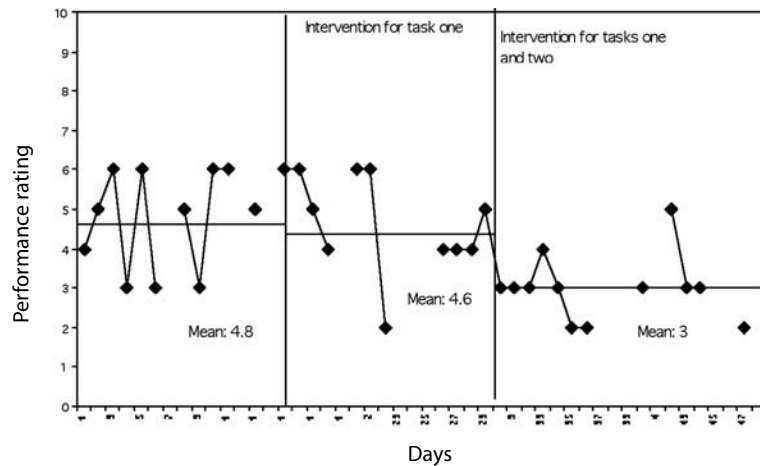
Task 1
Independent Play



Task 2
Self-feeding



Task 3
Donning shoes



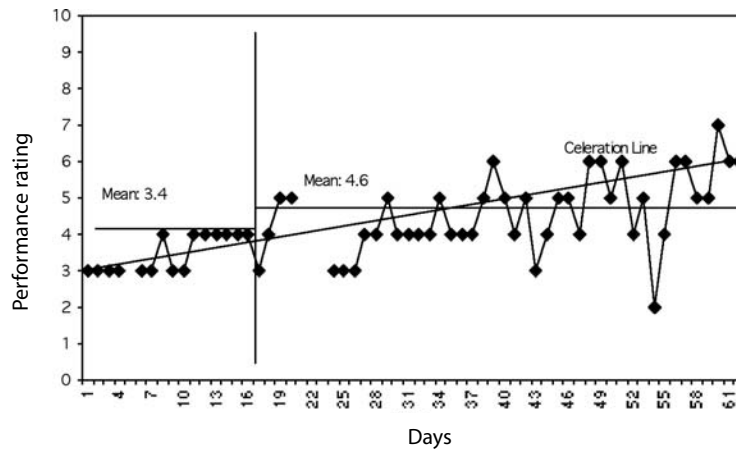
and intervention phases for each of the task.
 The COPM and the PEDI were re-administered during the follow-up interview. The three tasks were also videotaped again for the PQRS evaluation. At this time, parents were videotaped answering questions about their experience with the intervention.

Intervention

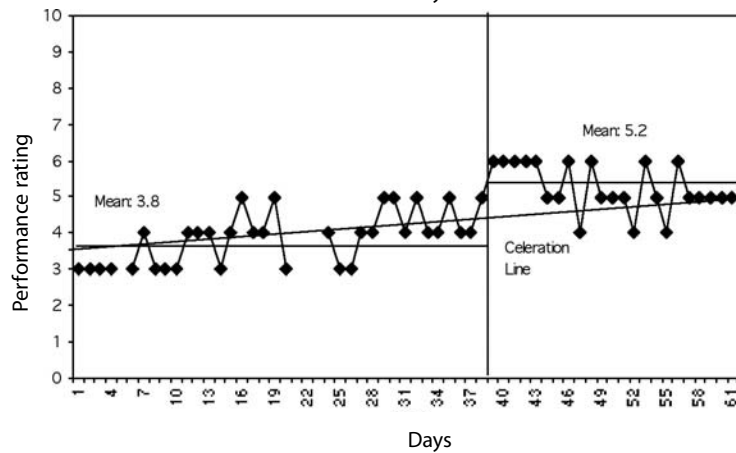
Intervention followed a predetermined baseline period of 14 days before the introduction of intervention of task one and 21 days before the introduction of task two. There were slight fluctuations in the timing of the start of the interventions due to family vacations and illness. Parents continued to record daily performance ratings for all three tasks. The

FIGURE 3
Line graphs representing the daily performance ratings of the three task performances completed by the parents for Child 3.

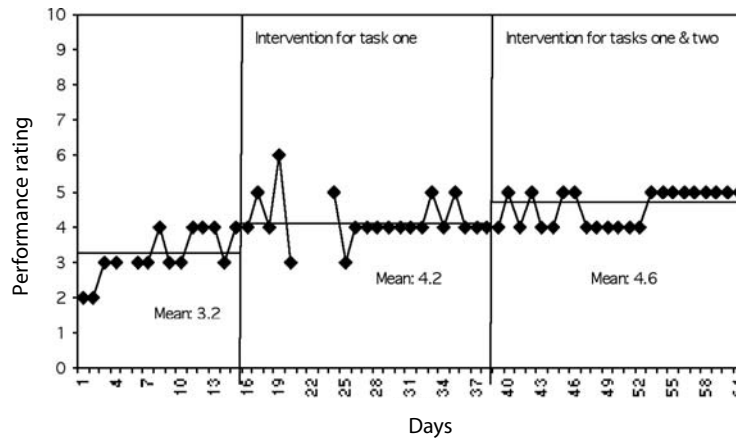
Child 3
Task 1
Self-feeding



Task 2
Donning jacket



Task 3
Pencil Use



third task was scored for performance by the parents throughout the study but intervention was not provided by the researcher until data collection was finished. This was done to further control for the possible effects of maturation and to control for potential effects of attention on perceived performance of targeted tasks.

The intervention provided in this study encompassed

most of the principles of the FCFT approach. The parents identified functional goals that the child performed daily and that they were motivated to perform. The constraints within the environment and the task for the performances were then identified using task analysis.

To develop the intervention strategies, the authors and one independent researcher/clinician generated lists of

TABLE 1
Summary of daily performance rating findings.

Child	Task	Visual Analysis	Celeration Line	Linear Regression	Summary of Findings for Daily Ratings
1	1. Pants	+	NC	NA	NC
	2. Feeding	+	+	Immediate +	+
	3. Shoes	NA	NA	NA	Stable
2	1. Play	+	+	NC	+
	2. Feeding	+	+	immediate and gradual +	+
	3. Pants	NA	NA	NA	Change evident
3	1. Feeding	+	NC	NC	NC
	2. Jacket	+	+	NA	+
	3. Pencil	NA	NA	NA	Change evident

Note: + = improvement; - = decline; NC = no change; NA = not applicable.

possible environmental and task constraints by observing videotaped performances of the chosen activities by each child. Once the constraints were identified, solutions to eliminate the constraints were developed. The more basic solutions were provided first. If no improvement in performance was observed following the initial intervention, the more complicated solutions were provided and structured to fit into the family's daily routine.

To gauge the possibility of co-intervention, parents were asked if they felt that any other services their children were receiving duplicated the goals that were being addressed by the study.

Data analysis

Visual analysis of graphical representations of data, the standard method of analysis for single subject designs, was completed (Ottenbacher, 1986). Graphs of the data were analyzed to determine if greater change occurred during the intervention periods than during the baseline period. As well, the timing of change was noted, that is whether change was evident immediately after intervention began, or whether it occurred more gradually.

The primary limitation of visual analysis is the likelihood of different interpretations between people. The additional use of celeration lines and linear regression complemented the interpretations of the visual data. Calculations were initially completed to determine if there was serial dependency between the data points in the baseline using Bartlett's test. Where serial dependency was not present, linear regression was used to measure changes in performance by comparing the slopes for the baseline intervention phases using the *c*-statistic.

Since linear regression analysis does not account for serial dependency in the baseline data, celeration line analysis was used in the presence of serial dependency.

Celeration line analysis incorporates trends in the baseline data and is an appropriate analysis when serial dependency is present. Essentially, a celeration line separates all observations in the baseline phase in half, so that 50% are above the line and 50% are below. This line is extended into the intervention phase to determine if more observations are now falling above the line (Backman & Harris, 1999). Change in perceived performance was considered present if, in the absence of serial dependency, two of visual analysis, regression analysis and celeration line indicated change. Where serial dependency was detected, change in perceived performance was considered present if both visual analysis and celeration lines indicated change.

The primary outcome for this study focused on changes in perceived performance between the baseline and intervention phases for Task 1 and Task 2. To determine if there were any changes in Task 3 associated with the initiation of intervention for Task 1 or Task 2, the mean performance ratings for each phase of the study were compared to the overall mean. If the means from each phase did not fluctuate more than 15% from the overall mean, then the data was considered to be stable (Ottenbacher, 1986).

Pre- and post-COPM scores were compared using a change score of 2 to indicate a clinically significant change. Pre- and post-PEDI scores and PQRS scores were compared for the direction and amount of change.

Results

Child 1: Daily ratings of performance

Serial dependency was detected for Task 1 (donning pants) but not for Task 2 (self-feeding). The primary outcome for Child 1 was negative for Task 1 and positive for Task 2 (Figure 1, Table 1). There was an immediate and significant change in the perceived performance for Task 2 following

TABLE 2
Caregiver assistance scale of the Pediatric Evaluation of Disability Inventory (PEDI).

Domain	Pre-Intervention Scores	Post-Intervention Scores
Child 1		
Self-care	12	17
Mobility	15	16
Social Function	15	16
Child 2		
Self-care	11	19
Mobility	16	23
Social Function	14	11
Child 3		
Self-care	6	15
Mobility	15	15
Social Function	25	25

the introduction of intervention.

The data for Task 3 (donning shoes) remained stable throughout the study period as the mean performance ratings for each phase of the study did not fluctuate more than 5% beyond the overall mean.

PEDI, COPM & PQRS

The score for the self-care domain of the PEDI improved considerably. The scores for the other two domains, mobility and social function, remained relatively stable (Table 2).

The change scores for the COPM indicated that the parent reported clinically significant changes in performance and satisfaction for all three tasks (Table 3).

When masked observer ratings pre- and post-intervention using the PQRS were compared, no changes were detected for tasks one and three, but some change had occurred in Task 2 (Table 4).

Child 2: Daily ratings of performance.

No serial dependency was detected in either Task 1 (independent play) or Task 2 (self-feeding). The primary outcome for Child 2 was positive for both Task 1 and Task 2 (Figure 2, Table 1). The improvements in performance for Task 1 were found to be gradual following the introduction of intervention. The improvements in performance for Task 2 were found to be both immediate and gradual following the introduction of intervention. That is, there was an immediate improvement in the performance ratings and the performance continued to improve following successive intervention sessions.

The data for Task 3 (donning pants) was unstable. That is, change did occur in perceived performance of this task over the study period. However, visual inspection indicated that this change was in the direction of poorer performance.

PEDI, COPM, PQRS

The PEDI scores for self-care and mobility domains both improved. The score for the social function domain remained relatively stable (Table 2).

The change scores for the COPM indicated clinically significant changes in both performance and satisfaction for Task 1 and Task 2. There was no reported change in satisfaction for Task 3 but there was a slight improvement in performance (Table 3).

When masked observer ratings pre- and post-intervention using the PQRS were compared, marked change occurred in Task 1, but there was no change observed in Task 2 or Task 3 (Table 4).

Child 3: Daily ratings of performance

No serial dependency was found for Task 1 (self-feeding) but serial dependency was observed for Task 2 (donning jacket). There was no change in the primary outcome for Task 1; there was a positive change in the primary outcome for Task 2 (Figure 3, Table 1). Task 2 demonstrated both immediate and gradual improvements in performance.

The data indicates a positive change in performance for Task 3 (pencil use) during the first two phases and more stable (9%) in the third phase.

PEDI, COPM, PQRS

The PEDI scores for the self-care domain increased post intervention, while the scores for the mobility and social domains remained the same (Table 2).

The change scores for the COPM indicated a clinically significant change in satisfaction for Task 1 and performance for Task 2. There were slight improvements reported in the performance for Task 1 and satisfaction for Task 2 and no change reported in Task 3 (Table 3).

When masked observer ratings pre and post intervention using the PQRS were compared, there was some change in Task 1 and Task 3 but no change was observed in Task 2 (Table 4).

Interview results

None of the parents reported co-interventions that could have been responsible for changes observed during the study period. The parents all had positive comments about the intervention and felt that it fit into their daily routines and that the suggestions were practical. The parents also felt that there was an overall improvement in their child's performance in tasks that were addressed.

Discussion

The desired outcome of the FCFT approach is the successful achievement of functional tasks identified by the

TABLE 3
Pre- & post-intervention scores for all participants for the Canadian Occupational Performance Measure (COPM).

Task	Pre-Intervention Scores		Post-Intervention Scores		Change Scores	
	Perf.	Satisf.	Perf.	Satisf.	Perf.	Satisf.
Child 1						
1. Donning pants	1	2	6	8	5	6
2. Self-feeding	2	2	8	9	6	7
3. Donning shoes	2	2	4	6	2	4
Child 2						
1. Independent play	2	1	6	5	4	4
2. Self-feeding	5	5	9	10	4	5
3. Donning pants	1	1	2	1	1	0
Child 3						
1. Self-feeding	5	2	6	5	1	3
2. Donning jacket	2	4	5	5	3	1
3. Pencil use	3	4	3	4	0	0

Note: Perf. = performance; satisf. = satisfaction.
Change score of 2 or more points is considered clinically significant.

family as important to the child and family (Darrach et al., 2001). Four out of six tasks for which intervention was provided demonstrated change on the primary outcome. The results of this study support and confirm previous findings regarding the feasibility of the FCFT approach to enable families to identify functional tasks and to facilitate changes in achieving functional performance.

Positive change in one task for Child 1 was confirmed by parent and observer ratings. Positive changes in two tasks for Child 2 were partially confirmed by parent and observer ratings. Positive change in one task for Child 3 was partially confirmed by parent and observer ratings. The results suggest that a starting point for intervention may be to change constraints within the environment and the task before changing constraints within the child.

Within this study, addressing constraints in the task and the environment before constraints in the person was an efficient and straightforward approach to intervention. For two of the identified tasks (self-feeding for Child 1 and Child 2), one intervention visit to the home resulted in immediate improvements in performance for tasks. In these two situations, the intervention addressed constraints in the environment that increased the match of the environment to the child's abilities. These changes to the environment eliminated the need for the child to learn the task. Additional intervention for the tasks that demonstrated immediate improvements was not required. In two other of the tasks (independent play for Child 2 and donning a jacket for Child 3), gradual improvement was observed after only seven visits to the home. Supplemental intervention for tasks that had gradual improvement may have been indicated if the task was not achieved over a specific period of time. As constraints within the task and

the environment had been eliminated, supplemental intervention would begin to address the constraints within the person.

An additional effect of the intervention was the impact on the parents' awareness of their child's abilities. Parents consistently rated their child's performance at the higher end of the scale. The self-care domain of the PEDI was reported by the parents to have improved for all participants. The improvement in the self-care domain scores appears to reflect an increased perception by the parents of independence in all self-care activities of daily living performed by their children. However, the increase in the PEDI self-care domain scores may also be a reflection of the parents' observations of actual change in their child's daily performance. The scores for the other two domains of the PEDI, mobility and social function, remained the same for all participants with only one exception. The stability in these scores suggests that changes in self-care performance were not due solely to maturation.

The COPM scores showed generally improved perceptions of performance and improved satisfaction with the performance. Comments made by the parents at the end of the study also showed that they were satisfied with the intervention. The positive results of the parents' interpretation of their child's performance indicate that the parents considered the intervention successful in improving the child's performance. As noted above, it is also possible that the intervention may have raised the parents' awareness of the level of their child's abilities.

The PQRS results did not reflect the same degree of change found in the other assessments and were the only ones that were not reported by the parents. This raises the question of whether it is possible that the children's perfor-

TABLE 4
Performance Quality Rating Scale (PQRS) assessment.

Child	Task	Pre-Intervention Score	Post-Intervention Score
1	1. Donning pants	1	1
	2. Self-feeding	4	5
	3. Donning shoes	1	1
2	1. Independent play	1	5
	2. Self-feeding	3	3
	3. Donning pants	1	1
3	1. Self-feeding	3	4
	2. Donning jacket	1	3
	3. Pencil use	1	1

mance of the identified task did not change to the same degree as was reported by the parents. It may be that not as much change occurred as parents perceived, or that the parent ratings on the COPM were more sensitive than the PQRS.

Study limitations

The major limitation of this study is that the primary outcome was parents' subjective ratings on daily performance. Parents may have been biased in their ratings due to their expectation and hope that their child would progress as a result of the intervention provided. It must also be recognized that the parents were aware the child was receiving therapy, they played a role in the provision of therapy and they received intervention and equipment at no cost. For these reasons, the parents may have been influenced in their ratings of their child's performance in a positive direction.

Additionally, despite the positive findings of this study, it is difficult to attribute change in a child who is growing and maturing. Changes in performance may be attributed to the impact of the intervention, the transitional nature of the task or the carryover effect of intervention ideas by the parents from one task to another.

A further limitation of the study was the assumption that the parents identified tasks that were actually in transition. The identification of tasks in transition using the COPM was limited by the parents' interpretation of the request. However, from an FCS approach, the parents' needs and interpretations should be integrated into the intervention and therefore the parents' responses are valid. Future research and decision rules on the identification of tasks in transition for this population are required. Findings of a pilot study support the effectiveness of a combination of parent report and therapist observation for task identification (Law, Darrach et al., 1998).

There are also inherent limitations to using a single subject design and the subsequent analyses of the results.

The conclusions are limited to the participants in the study and may not be generalized to the population of preschool-aged children with cerebral palsy. The results of this study may be biased in favour of the intervention due to the personal interaction between the researcher and the families. Further research with control groups receiving a different intervention than FCFT is necessary.

Conclusions

The results of this study provide initial support for the principle of FCFT that suggests the use of all three aspects of the child, the task and/or the environment when developing intervention strategies. Improved performance may be either immediate or gradual depending on the task, the child and the intervention. Changing elements in the task and the environment are good starting points for intervention. This approach can raise the parents' awareness of the child's abilities and may lead to improved functional performance.

The positive outcomes of this study support the conclusion that the intervention focusing on the task and the environment may lead to positive changes in performance. This study is an early step in developing the evidence base to support the FCFT approach to intervention. FCFT has the potential to significantly alter the way therapy is provided and should be investigated further with larger populations.

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