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Dev Med Child Neurol. Author manuscript; available in PMC 2012 July 1.

Published in final edited form as:
Dev Med Child Neurol. 2011 July ; 53(7): 621–629. doi:10.1111/j.1469-8749.2011.03962.x.

Focus on function: a cluster, randomized controlled trial comparing child- versus context-focused intervention for young children with cerebral palsy

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Abstract

AIM—This study evaluated the efficacy of a child-focused versus context-focused intervention in improving performance of functional tasks and mobility in young children with cerebral palsy.

METHOD—A randomized controlled trial cluster research design enrolled 128 children (49 females, 79 males; age range 12mo to 5y 11mo; mean age 3y 6mo, SD −1y 5mo) who were diagnosed with cerebral palsy. Children across levels I to V on the Gross Motor Classification System (GMFCS) were included in the study. Children were excluded if there were planned surgical or medication changes during the intervention period. Therapists from 19 children's rehabilitation centers were block randomized (by occupational therapist or physical therapist) to a treatment arm. Children from consenting families followed their therapists into their assigned group. Children received child-focused (*n*=71) or context-focused intervention (*n*=57) over 6 months, returning to their regular therapy schedule and approach between 6 and 9 months. The primary outcome measure was the Pediatric Evaluation of Disability Inventory (PEDI). Secondary outcome measures included the Gross Motor Function Measure (GMFM-66), range of motion of hip abduction, popliteal angle and ankle dorsiflexion, the Assessment of Preschool Children's Participation (APCP), and the Family Empowerment Scale (FES). Outcome evaluators were masked to group assignment and completed assessments at baseline, 6 months, and 9 months.

RESULTS—Ten children did not complete the full intervention, six in the child group and four in context group. GMFCS levels for children in the study were level I (*n*=37), level II (*n*=23), level III (*n*=21), level IV (*n*=21), and level V (*n*=26). There were no significant differences at baseline between the treatment groups for GMFCS level, parental education, or parental income. For the PEDI, there was no significant difference between the treatment groups, except for a small effect

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($p<0.03$) on the Caregiver Assistance Mobility subscale between baseline and 9 months. The mean scores of both groups changed significantly on the Functional Skills Scales ($p<0.001$) and Caregiver Assistance Scales ($p<0.02$) of the PEDI after the 6-month intervention. There was no additional statistically significant change on the PEDI during the follow-up period from 6 to 9 months. A subgroup effect was found for age ($p<0.001$), with children younger than 3 years changing significantly more than older children. GMFCS level at baseline did not influence the amount of change on the PEDI scales. There were no significant differences between the treatment groups on the GMFM, range of motion measures, APCP or FES assessments. For the GMFM, there was a significant change over time from baseline to 6 months ($p<0.001$) and no significant change between 6 and 9 months. There was no adverse side effect as range of motion did not decrease in either group. Hip abduction increased significantly ($p<0.01$) at the 9-month assessment for both groups. For the APCP, significant changes for both treatment groups were found between baseline and 6 months for play intensity ($p<0.04$), physical activity intensity and diversity ($p<0.001$), and total score intensity ($p<0.01$).

INTERPRETATION—This study shows that child- or context-focused therapy approaches are equally effective and that frequency of intervention may be a critical component of successful intervention. Further evaluation is required to identify the various `dose-response' relations of amount of treatment and changes in functional abilities.

In many countries, children with cerebral palsy (CP) receive physical and occupational therapy services to facilitate development and to enhance performance in functional movement, self-care, play, school activities, and leisure. In the past, therapy interventions for children with CP have primarily focused on changing factors within the child at the domain of body function and structure, with the assumption that these changes will improve their abilities in the domains of activity and participation. Therapy approaches are increasing their focus on changing a child's abilities to complete activities. Emerging conceptual frameworks such as a dynamic systems approach to motor development and family-centered services have facilitated the development of alternative treatment approaches that focus on the child and family within their environment.[1–7]

Dynamic systems theory suggests that the most efficient motor behavior results from the spontaneous self-organization and interaction of many subsystems to achieve a functional goal.[3,8] The transactional relationships among the child, the task, and the environment result in efficient solutions for functional motor goals and tasks. Different environments may result in different solutions, and in the same environment, different children may demonstrate different solutions. The concept of self-organization suggests that `pattern and order can emerge from the process of the interaction of the components of a complex subsystem without the need for explicit instructions' (Thelen,[9] p79). This perspective of movement makes it more challenging to predict `cause and effect' movement solutions because of the influence of many factors. Dynamic systems theory challenges traditional treatment perspectives, suggesting that typical patterns of movement are not always the optimal solution to a motor goal. Emerging treatment models influenced by dynamic systems theory consider task or activity completion as the goal, with less emphasis on remediation or `normalization' of movement components.

Different terms have been used to describe the focus on functional performance: ecological task analysis,[10,11] functional therapy,[5] goal-directed functional therapy,[12] activity focused and goal directed,[13,14] activity focused,[15] and task-oriented.[7] Two before–after studies of young children with CP found significant improvements in function using an activity-focused or functional therapy approach.[12,14] In a randomized trial, children receiving task-oriented strength training and practice of functional tasks improved significantly more in gross motor activities than those receiving therapy emphasizing facilitation and normalization of movement patterns.[7] Ketelaar et al.[5] conducted a randomized trial in which

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therapists focused on changing the motor skills the child needed to perform a task within their natural environment, based on child- or parent-identified goals. This functional therapy approach was more effective in achieving self-care and motor outcomes than therapy focused on quality of movement.

The development and implementation of treatment approaches using a family-centered approach has emphasized that treatment should focus on child and family-identified goals. Wiart et al.[16] reported that parents valued involvement in setting therapy goals but often found that subsequent intervention focused less on those functional goals and more on movement quality. Parents believe that setting functional goals facilitates practice of skills and activities in the home.[17] Two recent studies found that goal setting leads to significant improvements in achievement of functional movement and activities.[14,18] In a recent study, Lowing et al.[13] found significant improvements in self-care, mobility, and motor capacity after goal-directed, activity-focused therapy compared with activity-focused therapy where the aims of therapy were more general.

An emerging treatment method based on dynamic systems theory and family-centered service focuses on improving a child's motor-based functional activities primarily by changing identified constraints in the task or environment.[6] This context-focused approach contrasts with interventions that have focused on facilitating changes within the child's movement abilities or skills. The goal is to change the task or environment to promote functional performance, to allow the use of a child's own movement strategies, and to encourage practice of tasks within the natural environment.[6] Pilot studies of the context-focused approach indicated that it was feasible and has potential to facilitate change in motor performance in young children with CP.[6,19]

What this paper adds

- This study is the first randomized trial for young children with CP to examine the effects of therapy focused on changing only task or environment, and not the child.
- Children who received the context-focused therapy made similar improvements to those receiving child-focused therapy.
- Frequency of therapy may be critical to the success of any intervention.

In summary, emerging ideas from dynamic systems theory and family-centered service have stimulated debate about the potential use of a context-focused approach for young children with CP, but evaluation of related intervention protocols is extremely limited. The objective of this multi-site, randomized clinical trial was to evaluate the efficacy of a context-focused approach compared with a child-focused approach in improving performance of functional tasks and mobility, and increasing participation in everyday activities in young children who have CP.

METHOD

A randomized controlled trial cluster research design was used to recruit children from children's rehabilitation centers. Approval was obtained from the McMaster University, University of Alberta, and Calgary Children's Hospital ethics committees. Therapists from 19 children's rehabilitation centers in Ontario and Alberta, Canada, were stratified by discipline (occupational therapist or physical therapist) and block randomized to a treatment arm (Fig. 1). Randomization was performed for all study therapists at the same time by the study research coordinator who was unaware of the exact randomization sequence. Children

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from consenting families followed their therapists into their assigned treatment arm. Because of the nature of the therapy intervention, therapists and participants were not blind to the treatment group.

The study sample size was estimated at 104 children per group to detect a difference of three points on the Pediatric Evaluation of Disability Inventory (PEDI), with a two-sided a value of 0.05 and a power of 80. The calculations assumed a cluster (number of children per therapist) size of three, and an intraclass correlation coefficient (ICC) value of 0.1, leading to a variance inflation factor (design effect) associated with therapists of 1.2.[20] Children were between 12 months and 5 years 11 months of age when they entered the study and had been diagnosed with CP.[21] Children at all levels of the Gross Motor Function Classification System (GMFCS)[22] were included. Children were excluded if there were planned surgical or medication changes during the 6-month study period that might have affected motor function. Children who were regularly receiving botulinum toxin type A injections were eligible, but parents were asked not to start a botulinum toxin type A regime during the study period. Study recruitment took place between September 2006 and June 2008, with the final assessments completed by April 2009.

Intervention

Children in the study received either the child-focused or context-focused approach for 6 months (frequency set at 18–24 sessions). All children returned to their regular therapy schedule and approach between assessments at 6 and 9 months. Parents in both groups received general information and education about their child's disability as well as specific strategies to practice at home that fitted with each treatment approach.

In the child-focused approach group, therapists identified the impairments underlying a functional limitation (e.g. tone, posture, range of motion), and provided therapy to remediate the impairments (motor, cognitive, or sensory) and practice specific movements and tasks. Therapists chose their treatment strategies from contemporary interventions discussed in the literature such as maintaining range of motion and joint alignment through stretching, casting, and splinting,[23–26] strength training,[27–30] sensorimotor training and stimulation,[31] bilateral isokinematic training,[32] weight-bearing through the hands,[33] and facilitation of normal movement patterns and postural control through physical handling and practice of functional activities.[34,35] Thus, the child-focused approach used a combination of therapeutic strategies focused on remediation of impairments and building children's skills and abilities through practice of functional activities.

The context-focused approach is described in detail in the accompanying article.[36] In summary, we used a primary therapist model: either an occupational therapist or a physical therapist was assigned for each child and conducted the intervention for that child (with the other therapist providing consultation). Motor-based tasks a child was initiating, trying to modify, or showing an interest in doing (but having difficulty accomplishing) were identified by parents using the Canadian Occupational Performance Measure.[37] Each child in this arm was videotaped at least once to record the child performing the tasks identified in the goals. For each identified task or goal, factors were identified in the task, environment, and/ or child that were hindering the child's performance. Working with the parents, the therapist identified these constraints through an analysis of observed task performance.[6] Treatment focused on changing the identified constraints within the task and / or environment. Whenever feasible, intervention included practice of tasks in natural environments (e.g. home, preschool). Children were encouraged to use compensatory strategies to achieve functional tasks. Therapists were instructed not to include remediation of the children's impairments.

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Treatment fidelity was ensured through several strategies. All therapists in both groups received 1½ days of training and continuing expert consultation throughout the study. A clearly defined classification of intervention strategies was developed for each intervention approach, to ensure that they were indeed different. To measure therapist adherence, children's attendance was monitored throughout the study. All therapists completed a log after each session to document therapy, and these were analysed to determine procedural reliability. Parents completed a weekly log to track any significant illnesses, additional intervention, or equipment received by their children during the study period.

Measurement of outcome

Outcome assessments were completed by seven independently trained evaluators who were masked to treatment allocation; they administered all outcome measures at baseline, 6 and 9 months. The primary outcome was capability and performance of functional tasks (mobility and self-care) as measured by the PEDI.[38] Scaled scores for the Functional Skills Scales and Caregiver Assistance Scales of the PEDI were used in the analyses. The PEDI has been validated in many studies and has excellent reliability and validity for our study population.

Secondary outcomes included range of motion, gross motor function, participation in everyday activities, and parent empowerment. The evaluators assessed range of motion of hip abduction, popliteal angle, and ankle dorsiflexion at the three assessment times and at 3 months (the midpoint of the intervention period). This extra assessment was done to ensure that children in the context arm were not at risk of decreased range of motion because no passive stretching was performed in this arm. All evaluators used the same measurement protocol and recorded the average of two consecutive measurements of each joint. The Gross Motor Function Measure (GMFM-66)[39] was used to evaluate motor abilities ranging from lying and rolling to independent walking, running, and jumping. The Assessment of Preschool Children's Participation (ACPC)[40] scale assessed children's participation in voluntary, day-to-day activities outside preschool. The ACPC consists of 45 pictures of activities across the areas of play, skill development, physical recreation, and social activities. Finally, the Family Empowerment Scale[41] was completed by parents to assess four dimensions of empowerment: systems advocacy, knowledge, competence, and self-efficacy.

Analysis

Outcomes were summarized for each treatment group and descriptive statistics calculated for all demographic variables. To test the effect of the intervention, differences between the means for the context-focused and child-focused groups were evaluated. An intention-to-treat analysis was used. Missing values were imputed using specific recommendations for each outcome measure. For each outcome measure, the differences in change scores between treatment arms from baseline to 6 and 9 months were estimated. Linear mixed-effects models were fitted using time and treatment as fixed effects and participant as a random effect, to reflect the repeated measures on each participant. Time was treated as categorical, so that both the 6- and 9-month time points could be compared with baseline. The treatment, sex, and discipline of treating therapist variables were dummy-coded to facilitate interpretation of the results. GMFCS was treated as a categorical variable, with level I as the reference group. Because the goal of the analysis was to estimate the difference in change scores between the two intervention groups, the time×treatment interaction was retained in the model, even when it was not significant, as were the main effects of time and treatment.

Covariates were included in the model in the following order: GMFCS, age, sex, and discipline (occupational therapist or physical therapist). The number of co-interventions was

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too small to include as a covariate, but the numbers were similar across treatment groups. Initially, both a covariate main effect and a treatment×covariate effect were included in the model. If the interaction term was not significant and did not improve the model (as determined with a likelihood ratio test), it was eliminated and the analysis was repeated with just the covariate term. If the covariate alone did not improve the model then it was removed and the next covariate was added. Maximum likelihood estimation was used to compare competing models. After a model was selected, restricted maximum likelihood estimation was used to estimate differences between groups because the study was unbalanced (71 children in the child-focused arm, 57 in the context-focus group). In addition to the covariates listed above, level of parental education was entered as a potential covariate for the Caregiver Assistance outcomes; however, it was not significant for either of the Caregiver Assistance outcomes and was not included in the final models. Model fitting was performed using the baseline and 6-month data. The models did not include the therapist cluster effects because the estimated ICCs for the PEDI outcomes were small, indicating that the cluster effect was low.[42]

RESULTS

Demographic information for the 128 children who completed the study is in Table I. There were 71 children in the child-focused group and 57 in the context-focused group. Ten children did not complete the full intervention (six in the child group, four in context group). Complete assessments were available for 128 children at baseline, 122 at 6 months, and 121 at 9 months. GMFCS levels for children in the study were level I (*n*=37), level II (*n*=23), level III (*n*=21), level IV (*n*=21), and level V (*n*=26). There were no significant differences at baseline between the treatment groups for GMFCS levels, parental education, or parental income. There were more males in the child-focused arm (70.4%) than in the context-focused arm (50.9%). For botulinum toxin injections, the numbers in each group were similar. There was no significant difference in the change scores of the PEDI outcomes for the Functional Skills Scales and Caregiver Assistance Scales self-care and mobility subscales over 6 months for children with or without botulinum toxin type A; thus all children were included in the analyses. The average number of children per therapist was 1.77, lower than the estimated number of 3.0. Therapist cluster effect for the PEDI was calculated as the proportion of therapist variance (within treatment arm) relative to the error variance. On the four PEDI scales, the therapist cluster effect ICCs (range 0.08–0.13) were very low compared with child and error variation (0.86–0.97).

The mean number of treatment sessions from baseline to 6 months was equivalent between groups. Over the intervention period, children in the child-focused arm received a mean of 18.7 therapy sessions (SD 3.0) compared with 17.7 therapy sessions (SD 3.0) in the context arm. All children returned to their regular therapy frequency between the 6 months and the 9-month follow-up assessments. Treatment frequency between 6 and 9 months decreased for 70% of the children in the study, remained the same for 23%, and increased for 7%.

Therapist log notes were coded to determine the five most frequent therapeutic strategies for each intervention group. In the child-focused group, they were practice of upper extremity motor activities, practice of functional mobility activities, training components of movement, practice of stationary gross motor skills, and stretching. In the context-focused group they were modifying physical characteristics of environment, task, materials or tools, practice of functional mobility activities, changing a task instruction, adding adaptive equipment, and providing education/instruction to the family. The most frequent intervention strategies were distinct for each group except for the practice of functional mobility activities.

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Baseline, 6- and 9-month scores for all outcome measures are outlined in Table II. The GMFCS score at baseline and age were included in all PEDI analyses as significant covariates. For the PEDI Functional Skills Scales and Caregiver Assistance Scales self-care and mobility subscales, the mean scores of both groups changed significantly from baseline to 6 months after intervention, but there was no statistically significant change during the follow-up time between 6 and 9 months (Fig. 2). There was no significant difference between the treatment groups, except for a small effect on the Caregiver Assistance Scales mobility subscale from baseline to 9 months, reflecting a small increase for the child-focused group and a small decrease for the context-focused group during the follow-up to 9 months.

Analysis of Functional Skills Scales and Caregiver Assistance Scales self-care and mobility PEDI changes scores over time indicated that children younger than 3 years changed significantly more than older children. There was no significant difference in the amount of change on the PEDI scales for children across GMFCS levels. Effect sizes for PEDI scores by age ranged from 0.17 to 0.39, and standardized response means ranged from 0.55 to 0.87 (Table III).

For the GMFM-66, the variables GMFCS level at baseline and age were entered into the model as covariates. There was no significant difference between treatment groups. There was a significant change over time from baseline to 6 months, but no significant change between 6 and 9 months. There was no significant difference between treatment groups or over time for the family empowerment scores.

The left and right range of motion variables were modeled separately. There were no significant changes over time for hip extension, popliteal angle, or ankle dorsiflexion, or differences between groups. For both groups there was a significant improvement for hip abduction range between baseline and 9 months.

GMFCS, age, and parental education (primary parent) and a treatment by parental education interaction were investigated, in that order, as potential covariates for the APCP of Preschool Children's Participation measure. GMFCS level at baseline and age were significant covariates. The only significant changes happened between baseline and 6 months for play intensity, physical activity intensity and diversity, and total score intensity. There was no significant difference between treatment groups for the APCP scores.

DISCUSSION

The results of this study indicate that both context- or child-focused therapy interventions resulted in equivalent and significant improvements in self-care, mobility, and participation outcomes of the children during the 6-month intervention period. There was no significant difference between these two groups across a range of outcomes over the period of 6 months. The only significant difference between the groups was on the PEDI Caregiver Mobility Scale, where scores for children in the context group decreased during the follow-up period and scores in the child-focused group increased.

On the PEDI, the primary outcome measure, the scores of both groups on the Functional Skills Scales and Caregiver Assistance Scales self-care and mobility subscales improved significantly during study treatment; however, the improvements did not continue for three of the four PEDI scales from the 6-month assessment to the follow-up assessment 3 months later. During this follow-up period, children returned to their regular frequency of treatment, which for most children was less than during the intervention phase of the study. Without a control group, it is not possible to state definitively that changes from baseline to 6 months are due to the intervention approaches and not maturation. The change scores on the PEDI

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for the 6-month interventions ranged from 3.3 to 8.2 points, with effects sizes from 0.17 to 0.39. These are similar to other recent studies demonstrating the effectiveness of activity-focused interventions for children with CP.[5,12–14] For example, PEDI change scores for the first 6 months of the functional therapy intervention in the study of Ketelaar et al.[5] ranged from 2.2 to 6.1 points. The effect sizes of the two studies are hard to compare because the effect sizes for the Ketelaar study range from 0.74 to 0.98 over an 18-month period and the study included only children in GMFCS levels I and II.[43] At the level of the individual child, changes in scores in this study from baseline to 6 months represent observable functional improvement for children with CP. For example, a change of four points on the Functional Skills Scales self-care sub-scale translates into a child improving performance across seven activities whereas a change of eight points on the mobility scale translates into a child improving across nine activities. On the GMFM, children in the context group improved even without a direct focus on changing their motor skills. Perhaps the ability to improve functional skills and practice them more often contributed to the changes in their motor abilities.

The child-focused approach in this trial focused on changing impairments and improving children's skills and abilities through practice of functional activities. This intervention approach is similar to Valvano's description of the integration of impairment and activity-focused motor intervention for children with CP[15] and the intervention evaluated by Salem and Godwin.[7] One component of the intervention, the practice of functional activities, is similar to activity-focused intervention that was found to be effective in several recent studies.[5,12–14] The evidence supporting the use of an activity-focused approach for children with CP has increased substantially over the past several years.

This study contrasts with other recent randomized trials for young children with CP[5,7] as it is the first intervention study to examine the effects of therapy focused on changing only task or environment, and not the child. Children who received the context-focused therapy made similar improvements to those receiving therapy focused on changing the child's impairments and abilities using contemporary strategies from the literature. In previous trials, therapy focused on changing both the child's abilities and the environment[5] or the child through strength training and practice[7]. The results of this study support tenets of dynamic systems theory that emphasize the important role of task and environment in facilitating activity completion. As recommended by Whyte,[44] our study has examined two `key ingredients' of emerging therapy intervention approaches for young children with CP. Typically, therapists use both ingredients but they may spend more time and attention on intervention to change the child.[6] Lawlor and Mattingly[45] report that therapists often feel they are not delivering therapy unless it is `hands on'.

Recent studies have demonstrated the effectiveness of the inclusion of goal setting in the therapy process.[5,12,13,18] In the current trial, the context-focused approach included a specific goal-setting strategy using the Canadian Occupational Performance Measure. Although this component of the context-focused approach was not examined separately, it may have contributed to the overall changes in functional performance documented after the context-focused therapy intervention.

This study provides evidence that each intervention approach yields equivalent change after a 6-month intervention. We also found no difference between the therapy approaches for the outcome of parent empowerment. If both approaches are equally effective, therapists and families are able to discuss the treatment approach that best fits the intervention goals for the child, the child, and the family situation. Some families may want to concentrate on skill components, assuming that improving them will generalize to an array of functional skills. Others feel more comfortable working at functional goals in context, seeing progress

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through changes to the task and/or environment. Our findings support the idea that families, with their therapists, can choose the intervention that best suits their child's needs.

Children in both treatment arms received therapy weekly but many children in this age category in Canada receive therapy only once a month. The effect of frequency of treatment has not been studied extensively. A review of the effect of intensity of early intervention on outcome concluded that there was little evidence that more intensive programs lead to better outcomes for children with disabilities.[46] The few studies specifically evaluating the frequency of therapy interventions[47–52] typically compared interventions with higher treatment frequency than our study protocol of 18 to 24 sessions over the 6-month intervention period. For example, Bower et al.[47] compared a frequency of once a month to an intense treatment frequency of 44 hours over 3 months and reported no statistical difference between the groups' gross motor performance. Tsorlakis et al.[51] compared neurodevelopmental treatment delivered eight and 20 times a month and reported greater gains in motor performance by children receiving more treatment. Law et al.[53] found no difference in hand function outcomes between neurodevelopmental treatment intensities of once versus twice per week for 4 months. It is difficult to compare the results of these studies because of varying intensities of treatment, all more frequent than our study. None of these studies had a no-treatment control group. Mahoney et al.[54] found that children who attended therapy once per week over a year improved significantly more in motor development than those who attended once or twice per month. The minimal `dose–response' for therapy intervention has not been determined, but our results support therapy intervention at least of the frequency provided in this study, as recommended also by Schertz and Gordon in a recent editorial.[55]

The primary therapist model in the context-focused group did not negatively affect children's performance in this intervention arm. This finding suggests that different models of service delivery could be considered. In this study, the primary therapist was able to consult with colleagues and clinicians, so this model may not be more cost-effective than the traditional model of physical and occupational therapists providing intervention ideas to a family. One of the advantages of the primary therapist model is that families have a primary contact and do not have to filter and manage intervention ideas from many sources. Research is needed to determine the effectiveness of the primary therapist model for children with CP.

The range of motion results suggest that the use of passive stretching by therapists needs further evaluation. Children in the context-focused group received no formal passive stretching from therapists and their range of motion was not negatively affected. Parents could continue to do a home program of stretching if they wished: the amount of informal passive stretching was not monitored but fewer than six parents indicated that they continued with passive stretching routines. Although range of motion and flexibility are important, there are other ways to maintain it. In light of a recent Cochrane review[56] that found stretching does not have a clinically important effect on joint mobility, further discussion is essential.

There are limitations to this study. Neither treatment approach represented `typical' therapy; occupational and physical therapy are most often a hybrid of child remediation strategies and of manipulation of the task and environment. We intentionally designed the study to separate the two approaches in an attempt to identify the `active ingredients' of effective therapy for children with CP. However, because of this separation of service approaches, we cannot extrapolate our findings to typical therapy services currently offered.

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Our study suggests that child- or context-focused therapy approaches can be effective and that frequency of intervention may be a critical component of successful intervention. We do not know the minimal frequency that is effective. Our results suggest, however, that three or four times a month can result in significant functional improvements in motor and self-care abilities. Further evaluation is required to identify the various `dose–response' relations of amount of treatment and changes in functional abilities. The family's preference for intervention frequency also needs to be considered.

Acknowledgments

We thank the children and their families who participated in this research. We acknowledge the effort and support of the study coordinators, occupational therapists, physical therapists, and administrative staff at the 19 children's rehabilitation centers and organizations in Ontario and Alberta, Canada, who participated in the study. We also sincerely thank Theresa Petrenchik and Virginia Wright for their contributions to the development of the treatment protocols and Lisa Avery for her work on the analyses of the study. This study was supported by a grant (number R01HD044444) from the National Institutes of Health, USA. MCL holds the John and Margaret Lillie Chair in Childhood Disability research. SDW holds a National Health Scientist Award from Health Canada, PR holds a Canada Research Chair from the Canadian Institutes of Health Research, and DJR receives support through the McMaster Child Health Research Institute.

ABBREVIATIONS

PEDI	Pediatric Evaluation of Disability Inventory
APCP	Assessment of Preschool Children's Participation

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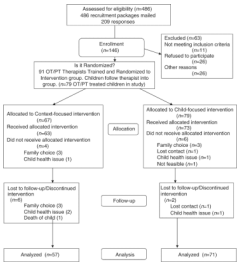


Figure 1.
Study enrollment flow diagram. OT, Occupational therapist; PT, Physiotherapist.

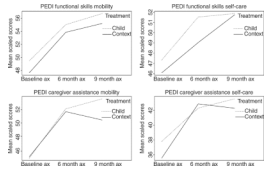


Figure 2.
Pediatric Evaluation of Disability Inventory scaled scores across both intervention groups at baseline, 6-month, and 9-month follow-up.

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Table I

Description of study sample (*n*=128: 71 child-focused, 57 context-focused)

	Child-focused *n* (%)	Context-focused *n* (%)	Total *n* (%)
Male	50 (70)	29 (51)	79 (62)
Female	21 (30)	28[a] (49)	49 (38)
GMFCS level			
I	24 (34)	13 (23)	37 (29)
II	11 (15)	12 (21)	23 (18)
III	11 (15)	10 (18)	21 (16)
IV	8 (11)	13 (23)	21 (16)
V	17 (24)	9 (16)	26 (20)
Chronological age at baseline, mean, (SD)	3.53 (1.43)	3.92 (1.42)	
Parent's education			
Did not complete high school	9 (13)	2 (4)	
Completed high school	10 (14)	10 (18)	
Some/completed community college	21 (30)	22 (39)	
Some/completed university	30 (42)	23 (40)	
Number of therapy sessions during study, mean (SD)	18.65 (2.94)	17.69 (3.36)	

[a] p=0.03, Pearson's χ^2 test with Yates' continuity correction.

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Table II

Mean scores (SDs) across all outcome measures comparing a child-focused with a context-focused intervention approach

	Baseline		6mo		9mo	
	Child	Context	Child	Context	Child	Context
PEDI Self-care FSS	47.34 (17.00)	46.09 (14.80)	51.54 (18.20)	49.05 (14.96)	51.88 (18.65)	51.77 (17.75)
PEDI Mobility FSS	49.46 (25.87)	47.64 (22.87)	55.02 (26.37)	53.85 (22.34)	56.72 (26.81)	55.20 (23.81)
PEDI Self-care CAS	37.80 (24.92)	35.56 (22.16)	42.31 (26.18)	42.89 (23.51)	43.57 (27.22)	42.29 (24.98)
PEDI Mobility CAS	44.75 (29.60)	44.94 (25.55)	52.11 (30.75)	51.69 (27.23)	53.62 (31.54)	50.44 (28.57)
GMFM-66 Score	53.31 (15.80)	52.14 (11.93)	55.82 (15.45)	54.26 (11.99)	56.84 (15.42)	54.11 (13.73)
Range of motion						
Hip abduction						
Right	37.42 (13.08)	38.77 (14.56)	38.33 (13.91)	39.31 (12.50)	41.08 (13.69)	39.78 (11.55)
Left	36.61 (12.60)	38.31 (15.55)	38.10 (12.50)	39.75 (12.88)	40.03 (12.86)	38.61 (12.25)
Hip extension						
Right	−0.43 (2.74)	−0.35 (1.86)	−0.12 (0.70)	−0.51 (2.58)	−0.09 (0.66)	−0.25 (1.10)
Left	−0.32 (1.69)	−0.37 (1.85)	−0.06 (0.34)	−0.68 (3.05)	−0.16 (0.83)	−0.13 (0.79)
Popliteal angle						
Right	24.41 (18.11)	22.35 (17.63)	22.55 (16.71)	21.07 (17.13)	25.34 (18.20)	25.63 (20.35)
Left	24.80 (17.90)	21.85 (17.19)	23.31 (17.94)	19.77 (17.61)	26.33 (17.04)	23.66 (20.05)
Ankle dorsiflexion						
Right	14.23 (15.52)	17.88 (23.23)	14.53 (14.76)	15.11 (15.43)	13.44 (13.47)	12.66 (18.61)
Left	15.35 (15.72)	18.32 (22.97)	13.60 (14.13)	13.92 (16.61)	13.37 (12.79)	12.77 (17.50)
Family Empowerment Scale						
Family	4.38 (0.47)	4.21 (0.63)	4.37 (0.49)	4.30 (0.47)	4.36 (0.43)	4.21 (0.50)
Services	4.24 (0.53)	4.14 (0.64)	4.28 (0.50)	4.22 (0.46)	4.26 (0.56)	4.22 (0.47)
Community	2.68 (0.87)	2.42 (0.69)	2.80 (0.83)	2.53 (0.69)	2.84 (0.81)	2.63 (0.71)
Assessment of Preschool Children's Participation: intensity scores						
Play	3.64 (1.50)	3.60 (1.50)	3.90 (1.53)	3.82 (1.49)	3.78 (1.44)	3.96 (1.55)
Social activities	2.21 (1.14)	2.16 (1.03)	2.34 (1.07)	2.34 (1.02)	2.32 (0.99)	2.30 (1.00)
Skill development	2.67 (1.42)	2.57 (1.20)	2.73 (1.23)	2.78 (1.09)	2.87 (1.12)	2.85 (1.07)
Active physical activities	2.60 (1.37)	2.58 (1.18)	2.93 (1.27)	2.86 (1.17)	2.63 (1.41)	2.54 (1.34)

PEDI, Pediatric Evaluation of Disability Inventory; FSS, Functional Skill Scale; CAS, Caregiver Assistance Scale; GMFM, Gross Motor Function Measure.

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Table III

Effect sizes and standard response means for the PEDI outcomes, overall and by age groups

	Functional skills		Caregiver assistance	
	Mobility	**Self-care**	**Mobility**	**Self-care**
Effect size				
All children	0.26	0.22	0.23	0.23
Aged <4y	0.39	0.36	0.31	0.26
Aged 4y+	0.17	0.14	0.17	0.24
Standard response mean				
All children	0.87	0.76	0.57	0.55
Aged <4y	1	1.17	0.62	0.46
Aged 4y+	0.75	0.44	0.51	0.65
Sample size				
All children	114	109	119	121
Aged <4y	63	60	63	64
Aged 4y+	51	49	56	57

PEDI, Pediatric Evaluation of Disability Inventory.