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Interventions and Management

1. Dev Neurorehabil. 2013 Mar 11. [Epub ahead of print]

The effect of long-term conventional physical therapy and independent predictive factors analysis in children with cerebral palsy.

Chen YN, Liao SF, Su LF, Huang HY, Lin CC, Wei TS.

Division of Physical Therapy, Department of Physical Medicine and Rehabilitation, Changhua Christian Hospital, Changhua, Taiwan.

Objectives: This study evaluated the effect of long-term conventional physical therapy (PT) on cerebral palsy (CP) children and to identify the predictors of therapy's response. **Methods:** We performed a retrospective review of CP children treated with PT, and their motor function was assessed every 3 months between 2008 and 2011. **Results:** Fifty-six children with a mean age of 4.2 ± 2.8 years, gross motor function classification system (GMFCS) levels were level I (n=14), level II (n=20), level III (n=5), level IV (n=8), and level V (n=9). In the generalized estimating equations model, there was a significant improvement in the Gross Motor Function Measure (GMFM-66) score ($p < 0.001$); the improvement was different in five GMFCS levels ($p < 0.001$) and GMFCS level II had faster progression. The younger CP children had better PT efficacy, and the GMFM-66 score continued improving until 8.4 years old in the older group. **Conclusion:** The long-term conventional PT is effective even in older CP children, and PT was most efficient in younger children and GMFCS level II.

[PMID: 23477591](https://pubmed.ncbi.nlm.nih.gov/23477591/) [PubMed - as supplied by publisher]

2. Dev Neurorehabil. 2013 Mar 11. [Epub ahead of print]

Bimanual training for children with cerebral palsy: Exploring the effects of Lissajous-based computer gaming.

Peper CL, Van Loon EC, Van de Rijt A, Salverda A, Van Kuijk AA.

Research Institute MOVE, Faculty of Human Movement Sciences, VU University Amsterdam, Amsterdam, The Netherlands.

Objective: Hemiplegic cerebral palsy often results in impaired bimanual coordination, partly due to strong coupling between the arms. We aimed at inducing more flexibility in this coupling, to improve bimanual coordination.

Methods: We designed computer games involving simple perceptual goals, based on Lissajous feedback. Such feedback implicitly facilitates the performance of complex rhythmic bimanual coordination patterns. A sample of six children received 9 h of computer training over a 6 weeks period. The effects of this training on functional bimanual performance were explored using the Assisting Hand Assessment (AHA). Results: Gaming performance and bimanual rhythmic antiphase coordination improved after training. The AHA results were mixed. Two children improved significantly, but at a group level no significant effects were found. Conclusions: The results were evaluated in relation to the specificity of the AHA and the potential benefit of combining the proposed training with dedicated bimanual functional training programs.

[PMID: 23477428](#) [PubMed - as supplied by publisher]

3. Dev Neurorehabil. 2013 Mar 11. [Epub ahead of print]

Effects of task-specific training on functional ability in children with mild to moderate cerebral palsy.

Kumban W, Amatachaya S, Emasithi A, Siritaratiwat W.

Improvement of Physical Performance and Quality of Life (IPQ) Research Group, Faculty of Associated Medical Sciences, School of Physical Therapy, Khon Kaen University , Thailand.

Objective: To examine the relationship between Five times sit-to-stand Test (FTSST) and functional tests and investigate the effects of task-specific training on functional ability in children with mild to moderate cerebral palsy (CP). Methods: Twenty-one subjects were randomly assigned to experimental and control groups. Motor Assessment Scale (MAS: sit-to-stand), Pediatric Balance Scale (PBS), Functional Reach Test and FTSST were tested before training, after training and at follow-up at 6 weeks post training. Results: FTSST correlated significantly with MAS ($p=-0.733$) and with PBS ($p=-0.813$) in all children with CP. There were no significant differences in all outcomes between groups. However, FTSST and MAS in children with Gross Motor Function Classification System-Expanded and Revised levels I-II were significantly different between pre and post training within the experimental group ($p=0.03$). Conclusions: FTSST is a reliable and valid functional outcome measure after the task-specific training in children with mild to moderate CP.

[PMID: 23477366](#) [PubMed - as supplied by publisher]

4. Dev Neurorehabil. 2013;16(2):121-8. doi: 10.3109/17518423.2012.727106.

Pilot study: Investigating the effects of Kinesio Taping® on functional activities in children with cerebral palsy.

da Costa CS, Rodrigues FS, Leal FM, Rocha NA.

Department of Physiotherapy, Neuropediatric Research Unit, Federal University of São Carlos, Rodovia Washington Luis , São Carlos 13565-010 , Brazil.

Objective: To investigate the immediate effects of Kinesio Taping® (KT) on sit-to-stand (STS) movement, balance and dynamic postural control in children with cerebral palsy (CP). Methods: Four children diagnosed with left hemiplegic CP level I by the Gross Motor Function Classification System were evaluated under conditions without taping as control condition (CC); and with KT as kinesio condition. A motion analysis system was used to measure total duration of STS movement and angular movements of each joint. Clinical instruments such as Pediatric Balance Scale (PBS) and Timed up and Go (TUG) were also applied. Results: Compared to CC, decreased total duration of STS, lower peak ankle flexion, higher knee extension at the end of STS, and decreased total time in TUG; but no differences were obtained on PBS score in KT. Conclusion: Neuromuscular taping seems to be beneficial on dynamic activities, but not have the same performance in predominantly static activities studied.

[PMID: 23477465](#) [PubMed - in process]

5. Dev Neurorehabil. 2013;16(2):79-88. doi: 10.3109/17518423.2012.715313.**Effect of a trunk-targeted intervention using vibration on posture and gait in children with spastic type cerebral palsy: A randomized control trial.**

Unger M, Jelsma J, Stark C.

Division of Physiotherapy, Faculty of Health Sciences, Stellenbosch University, Cape Town, South Africa.

Aim: This study aimed to determine whether strengthening trunk muscles using vibration can improve posture and gait in children with spastic-type cerebral palsy (STCP). **Methods:** A total of 27 children (6-13 years) participated in a single-blinded pre-post crossover experimental trial. The 1-Minute Walk Test, 2D-posturography, ultrasound imaging and sit-ups in one minute were used to assess effect on gait, posture, resting abdominal muscle thickness and functional strength. **Results:** Significant increase in distance walked ($p < 0.001$), more upright posture, an increase in sit-ups executed ($p < 0.001$) and an increase in resting thicknesses of all the four abdominal muscles - transversus abdominis ($p = 0.047$), obliquus internus ($p = 0.003$), obliquus externus ($p = 0.023$) and the rectus abdominis ($p = 0.001$) was recorded. Strength and posture were maintained at 4-weeks post-intervention. **Conclusion:** A trunk-targeted intervention using vibration can improve posture and gait in children with STCP without any known side effects. It is recommended that vibration and specific trunk strengthening is included in training or rehabilitation programmes. Effects of vibration on force generation and spasticity need further investigation.

[PMID: 23477461](#) [PubMed - in process]**6. Res Dev Disabil. 2013 Mar 4;34(5):1595-1601. doi: 10.1016/j.ridd.2013.02.004. [Epub ahead of print]****Gait patterns in twins with cerebral palsy: Similarities and development over time after multilevel surgery.**

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Department of Orthopedics and Trauma Surgery, Heidelberg University Hospital, Schlierbacher Landstrasse 200a, 69118 Heidelberg, Germany. Electronic address: stefan.vandrongelen@med.uni-heidelberg.de.

To examine gait patterns and gait quality, 7 twins with cerebral palsy were measured preoperatively and after surgical intervention. The aim was to study differences and/or similarities in gait between twins, the influence of personal characteristics and birth conditions, and to describe the development of gait over time after single event multilevel surgery. A standardized clinical exam and a three-dimensional gait analysis were performed. Gait patterns were classified according to Sutherland and Davids, and the Gillette Gait Index was calculated as a global measure of the gait impairment. Next to subject characteristics at time of first measurement, and at time of birth, birth conditions were collected. Gait patterns were determined as crouch gait in 13 legs, as stiff gait in 6 legs and as jump gait in 8 legs. One leg showed a normal gait pattern. The knee flexion-extension angle correlated most constant with the knee flexion-extension angle of the contralateral leg (range 0.91-0.99). Correlations with the legs of the sibling showed variable correlations (range 0.44-0.99); with all other legs medium to high correlations of 0.73-0.91 were found. The Gillette Gait Index was found to initially decrease after surgical intervention. Similar correlations were found between twins or between legs for the gait pattern expressed by the knee flexion-extension angle, and the Gillette Gait Index improved after surgery. It seems that gait quality in twins with cerebral palsy is characterized predominantly by the traumatic disorder: genetic dispositions and personal characteristics only play a negligible role.

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7. Disabil Rehabil Assist Technol. 2013 Mar 12. [Epub ahead of print]**A new walking aid with axillary support for children with cerebral palsy: electromyographic evaluation.**

Botega R, Medola FO, Santos CB, Silva AT, Iunes DH, Purquerio BD.

Department of Mechanical Engineering, Sao Carlos Engineering School, University of Sao Carlos, Sao Carlos (SP), Brazil

Purpose: To present a new walking aid with axillary support (WAAS) for children with cerebral palsy (CP) and to investigate its impact on the lower limb muscles activation in the gait of children with CP. Method: Six children with spastic diparesis due to CP performed a straight line walking course in two situations: with and without using the WAAS. Each course was repeated three times for both situations, and electromyography (EMG) activity of quadriceps, hamstrings, tibialis anterior and gastrocnemius were recorded during all trials. Results: The use of WAAS significantly increased the EMG activity of the quadriceps and hamstrings during stance phase and tibialis anterior during swing phase, with no significant increase in gastrocnemius activation. Conclusion: The use of WAAS improved the synergism of lower limbs muscles of children with CP by reducing the coactivation of antagonistic muscles, especially during the swing phase of gait. Providing a walking aid with improved trunk stability may enable children with CP to improve muscular synergism and walking ability, thus favoring independent mobility, with possible gains in social participation and quality of life. Implications for Rehabilitation Children with cerebral palsy have problems with the development of normal gait, as a result of the reduced motor control and the impaired muscle synergism of the lower limbs. Standard walking aids do not provide proper trunk stability for this group of children. In a relatively small sample of children with cerebral palsy, a walking aid with axillary support was shown to be beneficial for the muscular synergism of the lower limbs during gait.

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8. Gait Posture. 2013 Mar 5. pii: S0966-6362(13)00122-7. doi: 10.1016/j.gaitpost.2013.02.009. [Epub ahead of print]**Effects of simulated crouch gait on foot kinematics and kinetics in healthy children.**

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Identification of secondary and tertiary impairments in neurologically induced gait deviations, such as crouch gait, is not always straightforward, but essential in order to decide upon the most efficient medical treatment in patients with cerebral palsy (CP). Until now, exact intersegmental dependency of the development of foot deformities has not been investigated. Therefore, the aim of this study was to explore if an artificially induced bilateral knee flexion contracture causes compensatory mechanisms in foot motion during gait in healthy children. Three-dimensional kinematic and kinetic data from 30 healthy children (mean age 10.6 years) were derived from the Oxford Foot model (OFM). Participants walked first in an artificially induced crouch gait (limitation of knee extension to 40°) and then normally. Walking speed was kept the same in both conditions. Analysis revealed small but significant ($p < 0.05$) differences between the two conditions in hindfoot and forefoot kinematics in all three planes during the stance phase as well as for all peak internal moments within the foot. In general the foot tended to compensate for an artificial knee flexion contracture with an increase in maximal dorsiflexion, eversion and external rotation of the hindfoot, which also allowed increased foot motion in other foot segments. The results of this study showed that an isolated proximal joint contracture had an influence on foot position during stance in healthy children. Further interpretation of the data in relation to CP children will be possible as soon as comparable OFM data of pathological crouch gait is available.

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9. Toxins (Basel). 2013 Mar 12;5(3):524-36. doi: 10.3390/toxins5030524.**Safety of botulinum toxin a in children and adolescents with cerebral palsy in a pragmatic setting.**

Papavasiliou AS, Nikaina I, Foska K, Bouros P, Mitsou G, Filiopoulos C.

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This retrospective study aimed to examine the safety of botulinum toxin A (BoNT-A) treatment in a paediatric multidisciplinary cerebral palsy clinic. In a sample of 454 patients who had 1515 BoNT-A sessions, data on adverse events were available in 356 patients and 1382 sessions; 51 non-fatal adverse events were reported (3.3% of the total injections number, 8.7% of the patients). On five occasions, the adverse reactions observed in GMFCS V children were attributed to the sedation used (rectal midazolam plus pethidine; buccal midazolam) and resulted in prolongation of hospitalization. Of the reactions attributed to the toxin, 23 involved an excessive reduction of the muscle tone either of the injected limb(s) or generalized; others included local pain, restlessness, lethargy with pallor, disturbance in swallowing and speech production, seizures, strabismus, excessive sweating, constipation, vomiting, a flu-like syndrome and emerging hypertonus in adjacent muscles. Their incidence was associated with GMFCS level and with the presence of epilepsy (Odds ratio (OR) = 2.74 - p = 0.016 and OR = 2.35 - p = 0.046, respectively) but not with BoNT-A dose (either total or per kilogram). In conclusion, treatment with BoNT-A was safe; adverse reactions were mostly mild even for severely affected patients. Their appearance did not necessitate major changes in our practice.

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10. Eur J Paediatr Neurol. 2013 Mar 4. pii: S1090-3798(13)00023-8. doi: 10.1016/j.ejpn.2013.02.001. [Epub ahead of print]**Quality of life in youngsters with cerebral palsy after single-event multilevel surgery.**

Himpens E, Franki I, Geerts D, Tack R, Van der Looven R, Van den Broeck C.

Rehabilitation Sciences and Physiotherapy Ghent, University College Arteveldehogeschool-Ghent University, Campus Heymans 2B3, De Pintelaan 185, BE-9000 Ghent, Belgium. Electronic address: eveline.himpens@ugent.be.

A single event-multilevel surgery (SEMLS) is today a well-established modality of treatment in children with cerebral palsy (CP). It comprises muscle lengthening/transfers and correction of bony deformities in a single surgical session. Functional improvements after SEMLS have been examined thoroughly, however little is known about the impact of SEMLS on the quality of life (QOL) of children with CP. This study reports on the QOL of children/adolescents with CP after SEMLS. Forty patients underwent SEMLS and were classified according GMFCS levels II-V, age and time span between surgery and questioning. The Cerebral Palsy Quality of Life Questionnaire for Children (CP QOL-Child) and an author developed questionnaire were completed to evaluate QOL. Overall, children/adolescents reported high quality of life scores after SEMLS on the CP QOL-Child. For all the domains of the CP QOL-Child the children reported significant higher scores than their parents (p < 0.05). Significant differences (p < 0.05) were found for the functional-related domains of the CP QOL-Child between GMFCS level III and levels IV-V, but not for the socio-emotional domains. Older children at the moment of surgery (15y0m-18y11m) reported significantly less 'pain and feeling about disability' than children who were younger when operated on (10y0m-14y11m). Almost all aspects included in the author developed questionnaire improved for the majority of the children after SEMLS. CONCLUSION: After SEMLS, children with CP report high quality of life, significantly higher than their parents perceived. Function and age may influence specific aspects of QOL after SEMLS.

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11. J Pediatr Orthop. 2013 Apr;33(3):303-8. doi: 10.1097/BPO.0b013e3182784b0c.**Outcomes of rectus femoris transfers in children with cerebral palsy: effect of transfer site.**

Scully CW, McMulkin ML, Baird GO, Gordon AB, Tompkins BJ, Caskey PM.

*Department of Orthopedics, Madigan Army Medical Center, Tacoma †Walter E. Griffin & Agnes M. Griffin Motion Analysis Laboratory, Shriners Hospitals for Children, Spokane, WA.

BACKGROUND: Distal rectus femoris transfer is a widely accepted and effective treatment for children with cerebral palsy presenting with stiff knee gait. Previous research has reported improvement in knee arc of motion regardless of transfer site; however, sample sizes and patient function were unmatched in these studies. The purpose of this study was to compare the outcomes of children with cerebral palsy treated with a distal rectus femoris transfer for stiff knee to 1 of 3 sites: medial to the semitendinosus (ST), medial to the sartorius (SR), or lateral to the iliotibial band (ITB). Sample sizes in the 3 groups were equal and matched by gross motor function of the subjects. **METHODS:** The motion analysis laboratory database was queried for subjects who had a rectus femoris transfer with preoperative and postoperative gait studies. The ITB group, 14 subjects (20 limbs), was the smallest group of subjects identified. The ITB group established the sample size for SR and ST groups, which originally had larger sample sizes, but were matched to reflect similar proportions of Gross Motor Functional Classification System Level to the ITB group. **RESULTS:** There were no significant differences between the 3 rectus femoris transfer groups preoperatively on knee gait variables ($P > 0.05$). Comparison of preoperative to postoperative data demonstrated significant gait improvements in knee arc of motion for the ITB, SR, and ST groups (11, 12, and 12 degrees, respectively) ($P < 0.05$). There were also significant improvements in timing of peak knee flexion in swing phase and knee extension at initial contact for all 3 groups, but no significant difference was seen between preoperative and postoperative when groups were compared against one another for these measures. **CONCLUSIONS:** Distal rectus transfer continues to be an effective procedure for treating stiff knee gait in cerebral palsy. The location site of the transfer resulted in equally beneficial outcomes; therefore, the transfer site location can be based on surgeon preference and concomitant procedures.

LEVEL OF EVIDENCE: III, Retrospective Comparative Study.

[PMID: 23482268](#) [PubMed - in process]

12. Neuropediatrics. 2013 Mar 13. [Epub ahead of print]**Ability and Stability of Running and Walking in Children with Cerebral Palsy.**

Iosa M, Morelli D, Marro T, Paolucci S, Fusco A.

Clinical Laboratory of Experimental Neurorehabilitation, Fondazione Santa Lucia IRCCS, Rome, Italy.

Objectives Many studies have examined how children with cerebral palsy (CP) manage to walk, but few have investigated running, yielding controversial results. The aim of this study was to quantitatively assess gait ability and its stability in children with hemiplegic CP while running and walking. **Methods** A group of 20 children with spastic hemiplegia due to CP (CPG, 5.1 ± 2.3 years old), and a group of 20 children with typical development (TDG, 5.9 ± 2.6 years old) underwent a 10-m walking/running test with a wearable triaxial accelerometer fixed to their lower trunk. Spatiotemporal gait parameters, root mean squares of upper body acceleration, and related harmonic and symmetry ratios were computed. **Results** Differences in gait speed were significantly higher during running (- 19% for CPG with respect of TDG) than during walking (- 14%, $p = 0.028$). Conversely, no significant changes were observed in terms of gait stability, and the differences in terms of gait harmony along anteroposterior axis recorded during walking (- 43%, $p < 0.001$) disappeared during running (+ 3%, $p = 0.834$). **Conclusions** During running, children with CP are slower than children with TD, but their gait was not less stable, and the harmony of their anteroposterior movements was even more similar to TDG than during walking.

Georg Thieme Verlag KG Stuttgart· New York.

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13. J Hum Kinet. 2012 May;32:167-74. doi: 10.2478/v10078-012-0033-5. Epub 2012 May 30.

The effect of aquatic intervention on the gross motor function and aquatic skills in children with cerebral palsy.

Dimitrijevic L, Aleksandrovic M, Madic D, Okicic T, Radovanovic D, Daly D.

Faculty of Medicine, Department of Physical Medicine and Rehabilitation, University of Niš, Niš, Serbia.

The objective of this study was to investigate the effect of an aquatic intervention on the gross motor function and aquatic skills of children with cerebral palsy (CP). Twenty-nine children with CP, aged 5 to 14, were recruited. Fourteen children completed an aquatic intervention (EG), and 13 children served as controls (CG). Two participants dropped out due to events (illness) unrelated to the intervention. The aquatic intervention lasted 6 weeks (2 sessions per week at 55 minutes per session) with a follow-up period of 3 weeks. The outcome measures were the Gross Motor Function Measure (GMFM) for motor function and the Water Orientation Test Alyn 2 (WOTA 2) for aquatic skills assessment. A significant improvement was observed in the secondary assessment of GMFM and WOTA 2. In contrast to the aquatic skills improvement, the GMFM change was not maintained at follow-up. Our results indicate that children with CP can improve gross motor function on dry land and aquatic skills with a 6-week water intervention. The intervention period was too short for sustainable improvement in dry-land motor skills after intervention (follow-up), but time was sufficient to achieve sustainable improvements in aquatic skills.

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14. IEEE Trans Neural Syst Rehabil Eng. 2013 Mar;21(2):218-24. doi: 10.1109/TNSRE.2013.2246583.

Postural responses of adults with cerebral palsy to combined base of support and visual field rotation.

Slaboda JC, Lauer RT, Keshner EA.

We employed a virtual environment to examine the postural behaviors of adults with cerebral palsy (CP). Four adults with CP (22-32 years) and nine healthy adults (21-27 years) were tested with a Rod and Frame protocol. They then stood quietly on a platform within a three-wall virtual environment. The platform was either kept stationary or tilted 3 into dorsiflexion in the dark or with pitch up and down visual field rotations at 30 /s and 45 /s. While the visual field rotated, the platform was held tilted for 30 s and then slowly returned to a neutral position over 30 s. Center of pressure (CoP) was recorded and center of mass (CoM) as well as trunk and ankle angles were calculated. Electromyography (EMG) responses of the ankle and the hip muscles were recorded and analyzed using wavelets. Larger angular deviations from vertical and horizontal in the Rod and Frame test indicated that adults with CP were more visually dependent than healthy adults. Adults with CP had difficulty maintaining balance when standing on a stationary platform during pitch upward rotation of the visual scene. When the platform was tilted during visual field rotations, adults with CP took longer to stabilize their posture and had larger CoM oscillations than when in the dark. The inability to compensate for busy visual environments could impede maintenance of functional locomotion in adults with CP. Employing a visual field stimulus for assessment and training of postural behaviors would be more meaningful than testing in the dark.

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15. Dev Neurorehabil. 2013;16(2):113-20. doi: 10.3109/17518423.2012.725107.

Performance of adults with cerebral palsy related to falls, balance and function: A preliminary report.

Morgan P, McGinley J.

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Aim: To describe performance on standardised measures of functional mobility and identify relationships between gait decline, falls history and risk scores, and Gross Motor Function Classification System (GMFCS) level. Method: Adults with cerebral palsy (CP) aged 30-65 years, GMFCS Levels I-III underwent a single assessment to complete performance and questionnaire measures of balance, mobility and falls. Results: Twenty-five ambulant community

dwelling adults with CP participated (mean 41 years) in this study. Fifteen participants (60%) reported gait decline (>age 18). The most frequent self-reported cause of decline was reduced balance (n=12). Seventeen participants (68%) reported prior falls. Group differences were found between GMFCS levels and falls risk (falls risk for older people-community, $p=0.025$), balance (Berg Balance Scale, $p=0.005$) and mobility (6min walk test $p=0.004$; timed up and go, $p=0.011$). Conclusion: Adults with CP experience mobility decline in early to middle adulthood, with reduced balance performance and elevated falls risk evident. There is urgent need for further research into falls risk factors using prospective falls data.

[PMID: 23477464](#) [PubMed - in process]

16. Res Dev Disabil. 2013 Mar 4;34(5):1388-1396. doi: 10.1016/j.ridd.2013.01.016. [Epub ahead of print]

Linear and nonlinear analysis of brain dynamics in children with cerebral palsy.

Sajedi F, Ahmadlou M, Vameghi R, Gharib M, Hemmati S.

Pediatric Neurorehabilitation Research Center, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran; Dynamic Brain Research Institute, Tehran, Iran.

This study was carried out to determine linear and nonlinear changes of brain dynamics and their relationships with the motor dysfunctions in CP children. For this purpose power of EEG frequency bands (as a linear analysis) and EEG fractality (as a nonlinear analysis) were computed in eyes-closed resting state and statistically compared between 26 CP and 26 normal children. Based on these characteristics accuracy of the classification between the two groups was obtained by enhanced probabilistic neural network (EPNN). Severity of gross motor and manual disabilities was determined by standard systems and the relation between the deficient brain dynamics and severity of the motor dysfunctions was obtained by Pearson's correlation coefficient. A definitely higher delta and lower theta and alpha powers, and higher EEG complexity in CP patients. As such a high accuracy of 94.8% in distinguishing the two groups was obtained. Moreover significant positive correlations were found between beta power and severity of manual disabilities and gross motor dysfunctions in the boys with CP. It is concluded that the obtained brain dynamics' characteristics are useful in diagnosis of CP. Furthermore severity of the motor dysfunctions in boys with CP could be evaluated by the beta activity.

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17. Auris Nasus Larynx. 2013 Mar 9. pii: S0385-8146(13)00042-4. doi: 10.1016/j.anl.2013.01.007. [Epub ahead of print]

Bilateral submandibular duct rerouting: Assessment of results on drooling in cerebral palsy cases.

Khadivi E, Ashraf Zadeh F, Bakhshae M, Fooladvand T, Movahed SR, Nabavi SS, Afzal Aghae M.

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OBJECTIVES: Drooling is a physiological phenomenon in infants which becomes unusual and even pathologic after 18 months of age. Cerebral palsy (CP), the most common etiology for physical disability, mostly occurs in cases of normal-intelligence kids who are socially active and therefore their disorders require special attention. One of the major problems kids with CP face is excessive drooling and several therapeutic methods have been suggested to treat this problem. In this study described herein, bilateral submandibular duct rerouting (BSMDR) surgery was performed to investigate its effect on drooling in children with CP. **METHODS:** From March 2007 to April 2011, 16 children aged 6-16 years old with cerebral palsy who suffered from excessive drooling were recruited. A thorough physical examination was performed and a questionnaire was completed for each case. Those who met the inclusion criteria and provided an informed consent were selected for BSMDR surgery. They were followed-up twice, 10 days and 6 months after the operation to evaluate the degree of drooling or other possible side effects of the surgery. **RESULTS:** Sixteen patients entered the study and underwent surgery. On the first follow-up visit 87.50% presented overall improvement, of which 56.25% showed good to excellent improvement in contrast to 31.25% who exhibited fair improvement. On the second follow-up an overall improvement was

observed in 81.25%, of which 43.75% showed good to excellent improvement compared to 37.50% with fair improvement. **CONCLUSION:** Considering that during both the first and second follow-up visit only two cases (12.5%) did not respond to treatment, it could be concluded that BSMDR surgery is an effective treatment for reducing drooling in CP children.

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18. J Pediatr Orthop. 2013 Apr;33(3):298-302. doi: 10.1097/BPO.0b013e31827d0b5b.

Do movement deviations influence self-esteem and sense of coherence in mild unilateral cerebral palsy?

Riad J, Broström E, Langius-Eklöf A.

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BACKGROUND: Individuals with unilateral cerebral palsy (CP) are often physically high functioning. Despite the mildness of the impairment, the movement deviations during walking are often noticeably deviant. In the arm, increased muscle tone causes posturing and decreased motion. In the lower extremity, gait deviations mainly involve the foot and ankle. The deviations often become more apparent with transitions between movements and during rapid movement but also when the person is emotionally affected. Arm posturing and gait deviations may be perceived as cosmetic and social impediments when the individual enters adolescence and becomes more self-conscious. The aim was to study the influence of movement deviations in the upper and lower extremity during walking, on self-esteem, and sense of coherence (SOC) in teenagers and young adults with mild unilateral CP. **METHODS:** Three-dimensional gait analysis was performed with an 8-camera system. Movement deviations of the lower extremity, the Gait Profile Score (GPS) and of the upper extremity, and the Arm Posturing Score (APS) were calculated. Self-reported questionnaires "I think I am" measuring self-esteem and SOC were used. **RESULTS:** Forty-four patients with a mean age of 17.6 years (range, 13.0 to 24.0 y), 22 females and 22 males, and 15 sex-matched and age-matched controls participated in the study. Forty-two patients were classified as Gross motor function classification scale (GMFCS) I and 2 as GMFCS II. Patients were rated with lower self-esteem than controls (mean, 63.4 vs. 84.7; $P=0.025$). The SOC assessments revealed no difference. The GPS and APS was higher in patients (6.9 vs. 4.1; $P<0.001$) and (mean, 10.5 vs. 5.7; $P<0.001$), respectively. The APS correlated with both self-esteem (coefficient -0.397; $P=0.001$) and SOC (coefficient -0.375; $P=0.05$). No correlations were found with the GPS. **CONCLUSIONS:** Although physically high functioning, movement deviations in teenagers and young adults with mild unilateral CP are correlated with lower self-esteem. This is more pronounced with increased arm movement deviation and should be considered when evaluating these individuals.

LEVEL OF EVIDENCE: Prospective cross-sectional study. Level III.

[PMID: 23482267](#) [PubMed - in process]

19. Phys Occup Ther Pediatr. 2013 Mar 11. [Epub ahead of print]

Perceptions of Parents of Children with Cerebral Palsy About the Relevance of, and Adherence to, Exercise Programs: A Qualitative Study.

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Purpose: The purpose of this study was to explore how parents of children with cerebral palsy, attending mainstream primary schools, perceive the relevance of, and adherence with, exercise programs. **Methods:** A qualitative research with constructivist approach was used. Semi-structured interviews were conducted with parents. Open-ended questions related to their role in supporting the child's recommended exercise program. A thematic analysis approach was used to generate three main themes. **Findings:** The themes were: exercise

program management and delivery, perceived feelings and personal responses, and external impact and support. Conclusion: Exercise programs, to be implemented by families at home and support workers in school, are often characterized as prescriptive and focused on the child's impairment. These need to be integrated into a more holistic approach that considers family and child preferences. If this is to be achieved, parents' perspectives must play a legitimate part in evaluating the effectiveness of practice.

[PMID: 23477291](#) [PubMed - as supplied by publisher]

20. Med J Islam Repub Iran. 2012 Nov;26(4):150-6.

Association between spasticity and the level of motor function with quality of life in community dwelling Iranian young adults with spastic cerebral palsy.

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BACKGROUND: Consequences of cerebral palsy in adulthood can affect physical, psychological capabilities and quality of life. The purpose of this study was to investigate the relationship between quality of life with spasticity and level of motor function in Iranian young adults with spastic cerebral palsy who were community dweller. **METHODS:** In an analytical cross sectional study, 77 participants with spastic cerebral palsy (44 women, 33 men) with age range of 20 to 40 years; (mean age 26.19±5 yr) took part in this study. They were enrolled from three Raad Rehabilitation Goodwill complexes in Tehran and Karaj cities. All subjects were recruited through convenient sampling. Severity of Spasticity for knee flexors was measured with Modified Tardieu Scale. In addition, the level of motor function, and quality of life were assessed respectively through Gross Motor Function Classification System and World Health Organization Quality of life questionnaire (WHOQOL- BREF). To analyze data, Pearson and spearman correlation coefficient was used. **RESULTS:** No correlation found between quality of life with knee flexor muscles spasticity and level of motor function ($p > 0.05$). **CONCLUSION:** Quality of life as a multi dimensional concept has been impacted by many factors such as physical status, environmental issues and culture. Possibly, severity of spasticity and level of function have a less pronounced effect on quality of life in community dwelling adults with cerebral palsy.

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21. Dev Neurorehabil. 2013 Mar 11. [Epub ahead of print]

Geographical patterns in the recreation and leisure participation of children and youth with cerebral palsy: A CAPE international collaborative network study.

King G, Imms C, Palisano R, Majnemer A, Chiarello L, Orlin M, Law M, Avery L.

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Purpose: To examine geographical variation in the leisure participation of children/youth with cerebral palsy (CP), using Children's Assessment of Participation and Enjoyment (CAPE) data from Australia, Canada (Ontario and Quebec) and the US. **Method:** Data from 1076 children/youth ages 6-20 years with CP were included. Analyses examined CAPE diversity scores in activity types as a function of region, age group and Gross Motor Function Classification System (GMFCS) group, controlling for family income, education and child gender. **Results:** There were only two substantial geographical differences: children/youth from the US took part in the fewest active physical activities; those from Ontario took part in the most self-improvement activities. The youngest age group took part in the most recreational activities, and those in GMFCS level IV/V had the lowest levels of participation in recreational, active physical and self-improvement activities, confirming previous findings. **Conclusions:** There were more similarities than differences in participation patterns for the three countries.

[PMID: 23477429](#) [PubMed - as supplied by publisher]

22. Dev Neurorehabil. 2013;16(2):102-12. doi: 10.3109/17518423.2012.723762.

Assessment of social function in four-year-old children with cerebral palsy.

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Objective: To determine whether scores from the social function domain of the Paediatric Evaluation of Disability Inventory (PEDI) would reflect differences among speech-language profile groups for children with cerebral palsy (CP). Methods: Thirty-four children with CP participated (mean age=54.4 months). PEDI social function raw scores, developmentally stratified skill levels, and types of skills mastered at a 75% criterion level were examined. Results: Significant differences were observed in social function scores overall and within early and age-appropriate skills among all profile groups with one exception. Skill mastery varied based on profile group and on developmental age category of each skill. Conclusions: The PEDI appears to capture language delay in children with CP, but it may not be sensitive to the impact of speech intelligibility deficits on social function. Findings call for the development of a new tool that more accurately assesses communicative activities and participation in children with CP.

[PMID: 23477463](#) [PubMed - in process]

23. Res Dev Disabil. 2013 Mar 4;34(5):1528-1535. doi: 10.1016/j.ridd.2013.01.026. [Epub ahead of print]

Clinimetric properties of the Assessment of Preschool Children's Participation in children with cerebral palsy.

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This study examines the criterion-related validity and clinimetric properties of the Assessment of Preschool Children's Participation (APCP) for children with cerebral palsy (CP). Eighty-two children with CP (age range, two to five years and 11 months) and their caregivers participated in this study. The APCP consists of diversity and intensity scores in the areas of play (PA), skill development (SD), active physical recreation (AP), social activities (SA), and total areas. Tests were administered at baseline and at six-month follow-up. Concurrent and predictive validities were identified by assessing the strength of correlations between APCP scores and criterion-related measures-the 66-item Gross Motor Function Measure (GMFM-66) and Functional Independence Measure for Children (WeeFIM). Responsiveness was measured by standardized response mean (SRM). Minimal detectable change (MDC) at the 95% confidence level (MDC95) and minimal clinically important difference (MCID) were analyzed. The APCP with GMFM-66 and WeeFIM had fair to excellent concurrent validity ($r=0.39-0.85$) and predictive validity ($r=0.46-0.82$). The SRM values of the APCP diversity and intensity scales in all areas were 0.8-1.3. The MDC95 and MCID ranges for all areas (i.e., PA, SD, AP, SA, and total areas) were 0.1-0.7 and 0.4-1.2 points for intensity scores, respectively, and 4-17% and 10-19% for diversity scores, respectively. Therefore, the APCP scale was markedly responsive to change. Clinicians and researchers can use these clinimetric APCP data to determine whether a change score represents a "true" or clinically meaningful effect at post-treatment and follow-up.

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24. Phys Occup Ther Pediatr. 2013 Mar 11. [Epub ahead of print]**A Systematic Review of Clinimetric Properties of Measurements of Motivation for Children Aged 5-16 Years with a Physical Disability or Motor Delay.**

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The purpose of this systematic review was to appraise the clinimetric properties of measures of motivation in children aged 5-16 years with a physical disability or motor delay. Six electronic databases were searched. Studies were included if they reported measuring motivation in school-aged children across occupational performance areas. Two reviewers independently identified measures from included articles. Evaluation of measures was completed using the COSMIN (consensus-based standards for the selection of health measurement instruments) checklist. A total of 13,529 papers were retrieved, 15 reporting measurement of motivation in this population. Two measures met criteria: Dimensions of Mastery Questionnaire (DMQ) and Pediatric Volitional Questionnaire (PVQ). There was evidence of adequate validity for DMQ, and preliminary evidence of test-retest reliability. Psychometric evidence for PVQ was poor. Both measures demonstrated good clinical utility. The large number of retrieved papers highlights the importance being attributed to motivation in clinical studies, although measurement is seldom performed. Both identified measures show promise but further psychometric research is required.

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25. Health Psychol. 2013 Mar 11. [Epub ahead of print]**Self-Concept Among Youth With a Chronic Illness: A Meta-Analytic Review.**

Ferro MA, Boyle MH.

Objective: The aim of this study was to use meta-analytic techniques to compare self-concept between children and adolescents (abbreviated to youth) with a chronic illness versus healthy controls, and to examine methodological influences on effect sizes. **Method:** Databases were searched for asthma, cerebral palsy, diabetes, epilepsy, and juvenile arthritis. Inclusion criteria were: 1) original research studies in English; 2) youth <18 years; 3) the inclusion of self-reported self-concept; and 4) data available to estimate effect sizes. Study quality was assessed with a modified Quality Index. Effect sizes were calculated as Hedges' *g* using a random effects model. **Results:** A total of 60 studies were analyzed. On average, youth with a chronic illness had compromised self-concept, $d = -0.17 [-0.27, -0.07]$. However, type of control group exerted a moderating influence that resulted in discrepant findings. Studies based on normative data reported higher self-concept in youth with a chronic illness, $d = 0.27 [0.06, 0.47]$, whereas studies that recruited healthy controls reported lower self-concept in youth with a chronic illness, $d = -0.25 [-0.34, -0.15]$. **Conclusions:** Self-concept is compromised in youth with a chronic illness; however, the effect size may be underestimated because of methodological weaknesses and systematic biases in existing studies. Future research should avoid the use of normative data and employ rigorous methods to ensure representative sampling and control of confounding variables to better appreciate the impact of chronic illness on youths' self-concept. (PsychINFO Database Record (c) 2013 APA, all rights reserved).

[PMID: 23477575](#) [PubMed - as supplied by publisher]

26. Maedica (Buchar). 2012 Dec;7(4):319-24.**Clinical correlations in cerebral palsy.**

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Cerebral palsy (CP) is a group of persistent (but not necessarily unchanged), movement, posture, muscle tone and

motor skills disorders non-progressive, with early onset, due to non-progressive impairments, occurring on an immature brain or a brain under development (prenatal, perinatal, postnatal during the first 3-4 years of life). It is associated to a variable extent with: cognitive disorders, epilepsy, sensory deficits, behaviour disorders. The study of the correlations between the clinical forms/subtypes of CP, comorbidities, and severity of functional impairment. It is a retrospective trial aimed only at patients with the diagnosis of cerebral palsy admitted at Paediatric Neurology Clinic of the "Alexandru Obregia" Clinical Hospital in 2010. Patients with cerebral palsy corresponding with the criteria for inclusion: 379. The spastic CP type has prevailed. Comorbidities like mental retardation, epilepsy, and ophthalmic disorders were found with greater frequency than in the studies in the literature. The unilateral spastic form was statistically correlated with slight functional impairment (GMFCS I), with the absence of comorbidities or mild mental retardation, or with focal epilepsy when there is epilepsy. The bilateral spastic, tetraparetic and dyskinetic forms were correlated significantly with severe functional impairment (GMFCS IV, V), with profound or severe retardation, microcephaly, swallowing disorders, statural, ponderal hypotrophy, blindness and epilepsy. The bilateral spastic paraparetic form, which in the literature is mentioned as having fewer associated disorders (for example strabismus, slight retardation), when there is severe functional impairment, it may have the same comorbidities as the tetraparetic form (similar to the cases studied in the hospital). Comorbidities are the main admission cause and it correlates with the severity and prognosis.

[PMID: 23483832](#) [PubMed] PMID: PMC3593283

Prevention and Cure

27. *Pediatr Clin North Am.* 2013 Apr;60(2):335-49. doi: 10.1016/j.pcl.2012.12.008.

Congenital cytomegalovirus infection: new prospects for prevention and therapy.

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Cytomegalovirus is the commonest congenital viral infection in the developed world, with an overall prevalence of approximately 0.6%. Approximately 10% of congenitally infected infants have signs and symptoms of disease at birth, and these symptomatic infants have a substantial risk of subsequent neurologic sequelae. These include sensorineural hearing loss, mental retardation, microcephaly, development delay, seizure disorders, and cerebral palsy. Antiviral therapy for children with symptomatic congenital cytomegalovirus infection is effective at reducing the risk of long-term disabilities and should be offered to families with affected newborns. An effective preconceptual vaccine against CMV could protect against long-term neurologic sequelae and other disabilities.

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28. *Dev Med Child Neurol.* 2013 Apr;55(4):357-363. doi: 10.1111/dmcn.12103.

Prevalence of early childhood disability in a rural district of Sind, Pakistan.

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AIM: Children born in low- and mid-income countries are at a high risk of developing disabilities, yet estimates of population-based prevalence are sparse. Our aim was to determine the prevalence of early childhood (0-5 year) disability in Sind, a rural area of Pakistan. METHOD: We conducted a cross-sectional household survey in a population of 25 196 households. The Ten Questions screen and the Signs of Disability in Newborn and Infants

screen were used. RESULTS: The disability prevalence in a population of 176 364 individuals was 5.5 out of 1000 in children under 2 years and 5.4 out of 1000 in children aged 2-5 years. Fifty-six per cent were males, and 56% had the disability recognized from birth or soon after. The mortality rate of children aged 0-5 years in the area was estimated as 30 out of 1000 live births. Cerebral palsy was the most common disability identified. The Ten Questions screen had better interrater agreement than the Signs of Disability in Newborn and Infants screen. INTERPRETATION: This is the largest reported household screening survey for early childhood disability at a population level from rural Pakistan. The comparatively low prevalence may be due to the younger age studied and high early childhood mortality. Our data highlight the importance of prospective surveillance at a population level and the need for preventive and support services.

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29. Dev Neurorehabil. 2013;16(2):129-32. doi: 10.3109/17518423.2012.737040.

Congenital idiopathic microcephaly in an infant: Congruence of head size with developmental motor delay.

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Objective: To determine if the degree of congenital, idiopathic microcephaly in a female infant was congruent with the degree of developmental motor delay she exhibited. Methods: A 6.5-month-old female infant with idiopathic microcephaly was referred for evaluation due to parental concerns about possible cerebral palsy. She was assessed with two standardized tests: the Motor Scale of the Bayley-II Scales of Infant Development and the Harris Infant Neuromotor Test. Results: The infant scored 2.3-2.6 SD (standard deviation) from the mean on both tests, a degree of developmental delay that was reasonably consistent with the degree of microcephaly (2.0 SD below the mean). Conclusion: These findings highlight the importance of head circumference measurements, even in infants with no known risks for microcephaly, and the need to conduct standardized developmental assessments in infants with head sizes =2 SD below the mean.

[PMID: 23477466](#) [PubMed - in process]

30. J Leg Med. 2012 Jul;33(3):313-79.

Electronic fetal monitoring: a bridge too far.

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[PMID: 22991955](#) [PubMed - indexed for MEDLINE]

31. Rev Obstet Gynecol. 2012;5(3-4):e121-5.

Electronic Fetal Monitoring: A Defense Lawyer's View.

Sartwelle TP.

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Electronic fetal monitoring (EFM) has been used for four decades, after its introduction without clinical trials. EFM spawned a birth injury litigation crisis centered on the myth that it predicts cerebral palsy (CP). The myth has resulted in lottery-like judgments against physicians. The American Congress of Obstetricians and Gynecologists (ACOG) and sister organizations worldwide have the power to halt EFM's clinical proliferation and the undeserved

litigation verdicts against physicians unjustly blamed for causing CP. This power has been unused. If ACOG and other organizations would declare EFM unreliable, it could change the clinical standard of care and alleviate the CP-EFM malpractice lottery.

[PMID: 23483132](#) [PubMed]

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