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Interventions and Management

1. PLoS One. 2014 Apr 9;9(4):e93378. doi: 10.1371/journal.pone.0093378. eCollection 2014.

Effect of motor imagery in children with unilateral cerebral palsy: FMRI study.

Chinier E1, N'guyen S2, Lignon G3, Ter Minassian A4, Richard I5, Dinomais M1.

BACKGROUND: Motor imagery is considered as a promising therapeutic tool for rehabilitation of motor planning problems in patients with cerebral palsy. However motor planning problems may lead to poor motor imagery ability. **AIM:** The aim of this functional magnetic resonance imaging study was to examine and compare brain activation following motor imagery tasks in patients with hemiplegic cerebral palsy with left or right early brain lesions. We tested also the influence of the side of imagined hand movement. **METHOD:** Twenty patients with clinical hemiplegic cerebral palsy (sixteen males, mean age 12 years and 10 months, aged 6 years 10 months to 20 years 10 months) participated in this study. Using block design, brain activations following motor imagery of a simple opening-closing hand movement performed by either the paretic or nonparetic hand was examined. **RESULTS:** During motor imagery tasks, patients with early right brain damages activated bilateral fronto-parietal network that comprise most of the nodes of the network well described in healthy subjects. Inversely, in patients with left early brain lesion brain activation following motor imagery tasks was reduced, compared to patients with right brain lesions. We found also a weak influence of the side of imagined hand movement. **CONCLUSION:** Decreased activations following motor imagery in patients with right unilateral cerebral palsy highlight the dominance of the left hemisphere during motor imagery tasks. This study gives neuronal substrate to propose motor imagery tasks in unilateral cerebral palsy rehabilitation at least for patients with right brain lesions.

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2. Rehabil Psychol. 2014 Apr 7. [Epub ahead of print]

A comparison of visual inspection time measures in children with cerebral palsy.

Kaufman JN, Donders J, Warschausky S.

Purpose/Objective: This study examined the performance of children with and without cerebral palsy on two inspection time (IT) tests, as accessible nonspeeded response measures of cognitive processing speed. **Research Method/Design:** Participants, ages 8 to 16, included 66 children with congenital CP and 119 typically developing peers. Measures were two visual IT tasks with identical target stimuli but differential response strategies either via

a traditional dual-key method or with an assistive technology pressure switch interface and response option scanning. Results: The CP group had slower IT than the control group independent of test version. Log transformations were used to address skew, and transformed mean intraclass correlations showed moderate agreement between test versions for both participant groups. Bland-Altman plots showed that at higher mean IT thresholds, greater discrepancies between test version scores were observed. Conclusions/Implications: Findings support the feasibility of developing tests that reduce speeded motor response demands. Future test development should incorporate increased gradations of difficulty at the extremes of neuropsychological functioning to more accurately assess the performance of individuals whose conditions are associated with atypical performance levels. (PsycINFO Database Record (c) 2014 APA, all rights reserved).

[PMID: 24708231](#) [PubMed - as supplied by publisher]

3. *Dev Med Child Neurol.* 2014 Apr 7. doi: 10.1111/dmcn.12453. [Epub ahead of print]

The Quality Function Measure: reliability and discriminant validity of a new measure of quality of gross motor movement in ambulatory children with cerebral palsy.

Wright FV1, Rosenbaum P, Fehlings D, Mesterman R, Breuer U, Kim M.

AIM: Optimizing movement quality is a common rehabilitation goal for children with cerebral palsy (CP). The new Quality Function Measure (QFM) - a revision of the Gross Motor Performance Measure (GMPM) - evaluates five attributes: Alignment, Co-ordination, Dissociated movement, Stability, and Weight-shift, for the Gross Motor Function Measure (GMFM) Stand and Walk/Run/Jump items. This study evaluated the reliability and discriminant validity of the QFM. **METHOD:** Thirty-three children with CP (17 females, 16 males; mean age 8y 11mo, SD 3y 1mo; Gross Motor Function Classification System [GMFCS] levels I [n=17], II [n=7], III [n=9]) participated in reliability testing. Each did a GMFM Stand/Walk assessment, repeated 2 weeks later. Both GMFM assessments were videotaped. A physiotherapist assessor pair independently scored the QFM from an assigned child's GMFM video. GMFM data from 112 children. That is, (GMFCS I [n=38], II [n=27], III [n=47]) were used for discriminant validity evaluation. **RESULTS:** QFM mean scores varied from 45.0% (SD 27.2; Stability) to 56.2% (SD 27.5; Alignment). Reliability was excellent across all attributes: intraclass correlation coefficients (ICCs) ≥ 0.97 (95% confidence intervals [CI] 0.95-0.99), interrater ICCs ≥ 0.89 (95% CI 0.80-0.98), and test-retest ICCs ≥ 0.90 (95% CI 0.79-0.99). QFM discriminated qualitative attributes of motor function among GMFCS levels (maximum $p < 0.05$). **INTERPRETATION:** The QFM is reliable and valid, making it possible to assess how well young people with CP move and what areas of function to target to enhance quality of motor control.

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4. *Acta Orthop Mex.* 2013 Mar-Apr;27(2):109-13.

Percutaneous tenotomy and aponeurotomy (PTA) for knee flexor contracture in children with spastic cerebral palsy [Article in Spanish]

De Pavía-Mota E, Neri-Gómez S, Reyes-Contreras G, Valencia-Posadas M.

Knee flexor muscle contracture is frequent in patients with spastic cerebral palsy. The purpose of the study was to determine whether percutaneous tenotomy and aponeurotomy may decrease knee flexor contracture in children with spastic cerebral palsy. **MATERIAL AND METHODS:** A prospective study of consecutive cases was conducted from January to December 2009 in 24 children with a diagnosis of moderate to severe spastic cerebral palsy who had knee flexor contracture with a popliteal angle ≥ 45 degrees and a gross motor function classification scale of 4 or 5; they underwent percutaneous tenotomy and aponeurotomy surgery and were followed-up for 24 months. Variance analysis with a factorial design was used for data analysis. **RESULTS:** The mean popliteal angle was 83.48 degrees preoperatively and 27.30 degrees by the end of the follow-up, with an improvement of 56.18 degrees ($p < 0.01$). Statistically significant differences were found in all measurements comparing them with the baseline values. **DISCUSSION:** Percutaneous aponeurotomy of knee flexor muscles is described. Compared to other procedures it provides the benefits of minimally invasive surgery, mild postoperative pain, short hospital stay - without using immobilization during the entire process- and children returned to their therapy program within five

days. CONCLUSION: Percutaneous tenotomy and aponeurotomy of knee flexors was shown to be a good alternative for the treatment of knee flexor contracture in patients with spastic cerebral palsy.

[PMID: 24701762](#) [PubMed - in process]

5. Res Dev Disabil. 2014 Apr 3;35(6):1357-1363. doi: 10.1016/j.ridd.2014.03.032. [Epub ahead of print]

The association of equinus and primary genu recurvatum gait in cerebral palsy.

Klotz MC1, Wolf SI2, Heitzmann D3, Maier MW4, Braatz F5, Dreher T6.

Primary genu recurvatum (GR) is less investigated and data presenting the prevalence among patients with bilateral spastic cerebral palsy (BSCP) is lacking in the literature. Equinus is mentioned as one of the main underlying factors in GR, but its influence on the severity and onset type of GR is mainly unanswered, yet. Hence, the purpose of this retrospective study was to assess the prevalence of GR in a large sample size in children with BSCP and to investigate sagittal plane kinematics to evaluate the influence of equinus on different GR types using data of three-dimensional gait analysis. GR was defined as a knee hyperextension of more than one standard deviation of an age matched control group during stance phase in either one or both of the limbs. Primary GR was defined as a GR without having previous surgery regarding the lower extremity, no selective dorsal rhizotomy and/or interventions like botulinum toxin injection, shock wave therapy or serial casting during the last 6 months in the patient history. In a retrospective study 463 patients with BSCP (GMFCS Level I-III) received three-dimensional gait analysis and were scanned for the presence of primary GR. Finally, 37 patients (23 males, 14 females) matched the determined inclusion criteria and were therefore included for further analysis in this study. Out of those patients seven walked with orthoses or a walker and were excluded from further statistical comparison: Kinematics of the lower limbs were compared between patients having severe (knee hyperextension >15°) and moderate (knee hyperextension 5-15°) GR and between patients showing an early (first half of stance phase) and a late (second half of stance phase) GR. Primary GR was present in 37 patients/52 limbs (prevalence 8.0/5.6%). Severe GR was associated with a decreased ankle dorsiflexion compared with moderate GR. Early GR showed an increased knee hyperextension compared to late GR. In conclusion GR is less frequent compared with crouch or stiff gait. Our findings support the importance of equinus as a major underlying factor in primary GR. In this context the influence of equinus seems to be more important in early GR.

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6. Case Rep Med. 2014;2014:349014. doi: 10.1155/2014/349014. Epub 2014 Feb 12.

Adult Hip Flexion Contracture due to Neurological Disease: A New Treatment Protocol-Surgical Treatment of Neurological Hip Flexion Contracture.

Nicodemo A, Arrigoni C, Bersano A, Massè A.

Congenital, traumatic, or extrinsic causes can lead people to paraplegia; some of these are potentially reversible and others are not. Paraplegia can cause hip flexion contracture and, consequently, pressure sores, scoliosis, and hyperlordosis; lumbar and groin pain are strictly correlated. Scientific literature contains many studies about children hip flexion related to neurological diseases, mainly caused by cerebral palsy; only few papers focus on this complication in adults. In this study we report our experience on surgical treatment of adult hip flexion contracture due to neurological diseases; we have tried to outline an algorithm to choose the best treatment avoiding useless or too aggressive therapies. We present 5 cases of adult hips flexion due to neurological conditions treated following our algorithm. At 1-year-follow-up all patients had a good clinical outcome in terms of hip range of motion, pain and recovery of walking if possible. In conclusion we think that this algorithm could be a good guideline to treat these complex cases even if we need to treat more patients to confirm this theory. We believe also that postoperation physiotherapy it is useful in hip motility preservation, improvement of muscular function, and walking ability recovery when possible.

[PMID: 24707293](#) [PubMed] PMCID: PMC3965955 Free PMC Article

7. Pediatr Radiol. 2014 Apr 8. [Epub ahead of print]**Ultrasound screening for decentered hips in children with severe cerebral palsy: a preliminary evaluation.**

Smigovec I1, Dapić T, Trkulja V.

BACKGROUND: Ultrasound (US) is routinely used for hip screening in children with developmental hip disorders, whereas standard hip surveillance in children with cerebral palsy is based on repeated X-ray assessments. **OBJECTIVE:** To evaluate US as a diagnostic tool in screening for decentered hips in children with cerebral palsy. **MATERIALS AND METHODS:** We conducted a prospective, diagnostic single-center assessor-blind study that included consecutive children (age 2-8 years) with cerebral palsy and severe motor disability who underwent US and X-ray hip assessment. US lateral longitudinal scans were used to determine lateral head distance. X-ray assessment was used to determine migration percentage. Diagnostic properties of lateral head distance in detecting hips with a migration percentage ≥ 0.33 (which requires preventive treatment) were evaluated overall ($n = 100$) and for hips assessed at the age 24-60 months ($n = 38$) or >60 to ≤ 96 months ($n = 62$). Fifty hips underwent US assessment by two investigators to evaluate inter-rater reliability and agreement. **RESULTS:** Prevalence of migration percentage ≥ 0.33 was 22.0% overall and 26.2% and 19.4% in the younger and older age-based subsets, respectively. Lateral head distance well discriminated hips with a migration percentage ≥ 0.33 (areas under the receiver operating characteristics [ROC] curves 94%, 99% and 92%, respectively). At the optimum cut-off values of lateral head distance (5.0, 5.0 and 4.8 mm, respectively), sensitivity was 95.5%, 100% and 100% overall and in the two age-based subsets, respectively, whereas specificity was 85.9%, 96.4% and 72.0%, respectively. Consequently, positive predictive value was relatively low, but negative predictive value was 98.5% (95% CI 92.1-100) overall and 100% (97.5% one-sided CI 87.2-100) and 100% (97.5 one-sided CI 90.2-100) in the two age-based subsets, respectively. Inter-rater reliability was high (intraclass correlation coefficient = 0.98, 95% CI 0.97-0.99) and 95% limits of agreement were reasonably narrow (-1.203 mm to 0.995 mm). **CONCLUSION:** In children with cerebral palsy, US can be reliably used in screening for decentered hips and can greatly reduce the need for repeated radiographic assessments, thus reducing radiation burden in these children.

[PMID: 24710864](#) [PubMed - as supplied by publisher]**8. Evid Based Spine Care J. 2014 Apr;5(1):38-51.****Surgical Correction of Scoliosis in Children with Spastic Quadriplegia: Benefits, Adverse Effects, and Patient Selection.**

Legg J1, Davies E2, Raich AL3, Dettori JR3, Sherry N3.

Study Rationale: Cerebral palsy (CP) is a group of nonprogressive syndromes of posture and motor impairment associated with lesions of the immature brain. Spastic quadriplegia is the most severe form with a high incidence of scoliosis, back pain, respiratory compromise, pelvic obliquity, and poor sitting balance. Surgical stabilization of the spine is an effective technique for correcting deformity and restoring sitting posture. The decision to operate in this group of patients is challenging. **Objectives:** The aim of this study is to determine the benefits of surgical correction of scoliosis in children with spastic quadriplegia, the adverse effects of this treatment, and what preoperative factors affect patient outcome after surgical correction. **Materials and Methods:** A systematic review was undertaken to identify studies describing benefits and adverse effects of surgery in spastic quadriplegia. Factors affecting patient outcome following surgical correction of scoliosis were assessed. Studies involving adults and nonspastic quadriplegia were excluded. **Results:** A total of 10 case series and 1 prospective and 3 retrospective cohort studies met inclusion criteria. There was significant variation in the overall risk of complications (range, 10.9-70.9%), mortality (range, 2.8-19%), respiratory/pulmonary complications (range, 26.9-57.1%), and infection (range, 2.5-56.8%). Factors associated with a worse outcome were a significant degree of thoracic kyphosis, days in the intensive care unit, and poor nutritional status. **Conclusion:** Caregivers report a high degree of satisfaction with scoliosis surgery for children with spastic quadriplegia. There is limited evidence of preoperative factors that can predict patient outcome after scoliosis. There is a need for well-designed prospective studies of scoliosis surgery in spastic quadriplegia.

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9. J Neuroeng Rehabil. 2014 Apr 3;11(1):49. [Epub ahead of print]**Inactive and sedentary lifestyles amongst ambulatory adolescents and young adults with cerebral palsy.**

Nooijen C, Slaman J, Stam H, Roebroek M, van den Berg-Emons R.

BACKGROUND: To assess physical behaviour, including physical activity and sedentary behaviour, of ambulatory adolescents and young adults with cerebral palsy (CP). We compared participant physical behaviour to that of able-bodied persons and assessed differences related to Gross Motor Functioning Classification System (GMFCS) level and CP distribution (unilateral/bilateral). **METHODS:** In 48 ambulatory persons aged 16 to 24 years with spastic CP and in 32 able-bodied controls, physical behaviour was objectively determined with an accelerometer-based activity monitor. Total duration, intensity and type of physical activity were assessed and sedentary time was determined (lying and sitting). Furthermore, distribution of walking bouts and sitting bouts was specified. **RESULTS:** Adolescents and young adults with CP spent 8.6% of 24 hours physically active and 79.5% sedentary, corresponding with respectively 123 minutes and 1147 minutes per 24 hours. Compared to able-bodied controls, persons with CP participated 48 minutes less in physical activities ($p < 0.01$) and spent 80 minutes more sedentary per 24 hours ($p < 0.01$). Physical behaviour was not different between persons with GMFCS level I and II and only number of short sitting bouts were significantly more prevalent in persons with bilateral CP compared to unilateral CP ($p < 0.05$). **CONCLUSIONS:** Ambulatory adolescents and young adults with CP are less physically active and spend more time sedentary compared to able-bodied persons, suggesting that this group may be at increased risk for health problems related to less favourable physical behaviour.

Trial registration: Nederlands trial register: NTR1785.

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10. J Rehabil Med. 2014 Apr 8. doi: 10.2340/16501977-1821. [Epub ahead of print]**Health-related physical fitness of ambulatory adolescents and young adults with spastic cerebral palsy.**

Nooijen C1, Slaman J, van der Slot W, Stam H, Roebroek M, van den Berg-Emons R.

Objective: To describe in detail the health-related physical fitness of adolescents and young adults with cerebral palsy, compared with able-bodied references, and to assess differences related to Gross Motor Functioning Classification System (GMFCS) level and distribution of cerebral palsy. **Design:** Cross-sectional. **Subjects:** Fifty ambulatory persons with spastic cerebral palsy, GMFCS level I or II, aged 16-24 years. **Methods:** Physical fitness measures were: (i) cardiopulmonary fitness by maximal cycle ergometry, (ii) muscle strength, (iii) body mass index and waist circumference, (iv) skin-folds, and (v) lipid profile. **Results:** Regression analyses, corrected for age and gender, showed that persons with bilateral cerebral palsy had lower cardiopulmonary fitness and lower hip abduction muscle strength than those with unilateral cerebral palsy. Comparisons between persons with GMFCS levels I and II showed a difference only in peak power during cycle ergometry. Cardiopulmonary fitness, hip flexion and knee extension strength were considerably lower ($< 75\%$) in persons with cerebral palsy than reference values. **Conclusion:** The distribution of cerebral palsy affects fitness more than GMFCS level does. Furthermore, adolescents and young adults with cerebral palsy have reduced health-related physical fitness compared with able-bodied persons. This stage of life has a strong influence on adult lifestyle, thus it is an important period for intervention.

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11. J Phys Ther Sci. 2014 Mar;26(3):423-5. doi: 10.1589/jpts.26.423. Epub 2014 Mar 25.**The effects of hippotherapy and a horse riding simulator on the balance of children with cerebral palsy.**

Lee CW1, Kim SG2, Na SS2.

Purpose: We with respect to their effects on the compared hippotherapy with a horseback riding simulator (JOBA, Panasonic Inc. JP) static and dynamic balance of children with cerebral palsy (CP). **Subjects and Methods:** Twenty-six children were randomly divided into two groups: a hippotherapy group that included 13 children, and a

horseback riding simulator (JOBA, Panasonic Inc., Japan) group, which was also composed of 13 children. The two groups participated in 1 hour of exercise per day, 3 times a week, for 12 weeks. The subjects' static balance ability was measured using BPM (software 5.3, SMS Healthcare Inc., UK) as the center of pressure sway length while standing for 30 seconds with their eyes open and looking to the front. Dynamic balance ability was measured using the PBS (Pediatric Balance Scale). Results: Both groups showed significant improvements in static and dynamic balance but significant differences between the two groups were not found. [Conclusion] The horseback riding simulator could be a useful alternative to hippotherapy for the improvement of static and dynamic balance of children with CP.

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12. J Phys Ther Sci. 2014 Mar;26(3):389-91. doi: 10.1589/jpts.26.389. Epub 2014 Mar 25.

Differences of respiratory function according to level of the gross motor function classification system in children with cerebral palsy.

Kwon YH1, Lee HY2.

Purpose: The current study was designed to investigate the difference in lung capacity and muscle strengthening related to respiration depending on the level of the Gross Motor Function Classification System (GMFCS) in children with cerebral palsy (CP) through tests of respiratory function and respiratory pressure. **Subjects and Methods:** A total of 49 children with CP who were classified as below level III of the GMFCS were recruited for this study. They were divided into three groups (i.e., GMFCS level I, GMFCS level II, and GMFCS level III). All children took the pulmonary function test (PFT) and underwent respiratory pressure testing for assessment of respiratory function in terms of lung capacity and respiratory muscle strength. **Results:** The GMFCS level III group showed significantly lower scores for all tests of the PFT (i.e., forced vital capacity (FVC), forced expiratory volume at one second (FEV1), and slow vital capacity (SVC)) and testing for respiratory pressures (maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP)) compared with the other two groups. The results of post hoc analysis indicated that the GMFCS level III group differed significantly from the other two groups in terms of FVC, FEV1, MIP, and MEP. In addition, a significant difference in SVC was observed between GMFCS level II and III. **[Conclusion]** Children with CP who had relatively low motor function showed poor pulmonary capacity and respiratory muscle weakness. Therefore, clinical manifestations regarding lung capacity and respiratory muscle will be required in children with CP who demonstrate poor physical activity.

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13. Am J Orthod Dentofacial Orthop. 2014 Apr;145(4):523-33. doi: 10.1016/j.ajodo.2013.06.025.

Functional and fixed orthodontic treatment in a child with cerebral palsy.

Işcan HN1, Metin-Gürsoy G2, Kale-Varlık S3.

Cerebral palsy is a permanent neuromuscular motor disorder that results from injury in the developing brain during the prenatal or postnatal period. Common functional and craniofacial problems related to cerebral palsy include impaired swallowing, chewing, and speech; maxillary transverse deficiency; excessive anterior facial height; and Class II malocclusion. This article reports the treatment of a 12-year-old girl with ataxic cerebral palsy; she had a dental and skeletal Class II malocclusion, maxillary transverse deficiency, and severe crowding in both arches. Treatment included rapid maxillary expansion with simultaneous functional therapy and fixed orthodontic extraction therapy in a period of 2 years 3 months. Vertical control was maintained by a vertical chin cap. An acceptable occlusion and improvements in facial esthetics, speech, and oral function were achieved.

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14. Spec Care Dentist. 2014 Apr 7. doi: 10.1111/scd.12071. [Epub ahead of print]**Oral health status of individuals with cerebral palsy at a nationally recognized rehabilitation center.**

Al-Allaq T1, Debord TK, Liu H, Wang Y, Messadi DV.

Cerebral palsy (CP) is a set of nonprogressive neuromuscular disorders caused by defects in the developing fetal brain. The aim of this study is to investigate the prevalence and distribution of various dental conditions including dental caries and periodontitis among individuals with CP who receive care at the Rancho Los Amigos National Rehabilitation Center dental clinic. Medical records of 478 patients between the ages of 3 and 78 years were reviewed. Patients were divided into four age groups: 3-20, 21-35, 36-55, and 56 and above year old. Data related to their dental conditions including caries, periodontitis, and other oral diseases were assessed. Statistical analyses were conducted to evaluate the correlations between these oral diseases and age, gender, ethnicity as well as their living conditions (home or group home). The 36-55-year-old age group displayed significantly more caries and periodontitis than any other age groups. Individuals aged 3-20 years showed a significantly lower rate of periodontitis and caries. There was no significant association between gender and race with these outcome variables but there was a correlation between these variables and living conditions. Differences in oral health exist among people with CP from different age groups and living conditions. These findings suggest that there is a dire need for more oral hygiene training and education for the care givers. Dental schools should better prepare their graduates to meet the treatment demands of individuals with special healthcare needs.

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[PMID: 24708141](#) [PubMed - as supplied by publisher]**15. Pediatrics. 2014 Apr 7. [Epub ahead of print]****Interventions to Reduce Behavioral Problems in Children With Cerebral Palsy: An RCT.**

Whittingham K1, Sanders M, McKinlay L, Boyd RN.

OBJECTIVE: To test Stepping Stones Triple P (SSTP) and Acceptance and Commitment Therapy (ACT) in a trial targeting behavioral problems in children with cerebral palsy (CP). **METHODS:** Sixty-seven parents (97.0% mothers; mean age 38.7 ± 7.1 years) of children (64.2% boys; mean age 5.3 ± 3.0 years) with CP (Gross Motor Function Classification System = I = 15, 22%; II = 18, 27%; III = 12, 18%; IV = 18, 27%; V = 4, 6%) participated and were randomly assigned to SSTP, SSTP + ACT, or waitlist. Primary outcomes were behavioral and emotional problems (Eyberg Child Behavior Inventory [ECBI], Strengths and Difficulties Questionnaire [SDQ]) and parenting style (Parenting Scale [PS]) at postintervention and 6-month follow-up. **RESULTS:** SSTP with ACT was associated with decreased behavioral problems (ECBI Intensity mean difference [MD] = 24.12, confidence interval [CI] 10.22 to 38.03, $P = .003$; ECBI problem MD = 8.30, CI 4.63 to 11.97, $P < .0001$) including hyperactivity (SDQ MD = 1.66, CI 0.55 to 2.77, $P = .004$), as well as decreased parental overreactivity (PS MD = 0.60, CI 0.16 to 1.04, $P = .008$) and verbosity (PS MD = 0.68, CI 0.17 to 1.20, $P = .01$). SSTP alone was associated with decreased behavioral problems (ECBI problems MD = 6.04, CI 2.20 to 9.89, $P = .003$) and emotional symptoms (SDQ MD = 1.33, CI 0.45 to 2.21, $P = .004$). Decreases in behavioral and emotional problems were maintained at follow-up. **CONCLUSIONS:** SSTP is an effective intervention for behavioral problems in children with CP. ACT delivers additive benefits.

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