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Interventions and Management

1. *J Physiother.* 2016 Jun 17. pii: S1836-9553(16)30016-9. doi: 10.1016/j.jphys.2016.05.013. [Epub ahead of print]

Constraint-induced movement therapy improves upper limb activity and participation in hemiplegic cerebral palsy: a systematic review.

Chiu HC, Ada L.

QUESTIONS: Does constraint-induced movement therapy improve activity and participation in children with hemiplegic cerebral palsy? Does it improve activity and participation more than the same dose of upper limb therapy without restraint? Is the effect of constraint-induced movement therapy related to the duration of intervention or the age of the children? **DESIGN:** Systematic review of randomised trials with meta-analysis. **PARTICIPANTS:** Children with hemiplegic cerebral palsy with any level of motor disability. **INTERVENTION:** The experimental group received constraint-induced movement therapy (defined as restraint of the less affected upper limb during supervised activity practice of the more affected upper limb). The control group received no intervention, sham intervention, or the same dose of upper limb therapy. **OUTCOME MEASURES:** Measures of upper limb activity and participation were used in the analysis. **RESULTS:** Constraint-induced movement therapy was more effective than no/sham intervention in terms of upper limb activity (SMD 0.63, 95% CI 0.20 to 1.06) and participation (SMD 1.21, 95% CI 0.41 to 2.02). However, constraint-induced movement therapy was no better than the same dose of upper limb therapy without restraint either in terms of upper limb activity (SMD 0.05, 95% CI -0.21 to 0.32) or participation (SMD -0.02, 95% CI -0.34 to 0.31). The effect of constraint-induced movement therapy was not related to the duration of intervention or the age of the children. **CONCLUSIONS:** This review suggests that constraint-induced movement therapy is more effective than no intervention, but no more effective than the same dose of upper limb practice without restraint.

[PMID: 27323932](#)

2. *Exp Brain Res.* 2016 Jun 20. [Epub ahead of print]

Anticipatory postural adjustments associated with a loading perturbation in children with hemiplegic and diplegic cerebral palsy.

Shiratori T, Girolami GL, Aruin AS.

Anticipatory postural adjustments (APAs) in preparation for predictable externally induced loading perturbation were studied in children with typically development (TD), hemiplegic (HEMI), and diplegic (DIPL) cerebral palsy. Twenty-seven children (n = 9 in each group) were asked to stand and catch a load dropped from a pre-specified height. Electrical activity of the leg and trunk muscles and center of pressure (COP) displacements were recorded to quantify the APAs. All groups were able to generate APAs prior to the perturbation, but the magnitude was smaller and the onset was delayed in the dorsal (agonist)

postural muscles in both HEMI and DIPL as compared to TD. HEMI and DIPL also generated APAs in the antagonist postural muscles. Anticipatory backward COP displacement was significantly different from the baseline value only in the TD and HEMI. HEMI and DIPL displayed a different postural control strategy; HEMI showed no difference in background postural activity from TD, but with diminished APAs in the agonist postural muscles compared to TD, while DIPL showed a higher background postural activity and diminished APAs in the agonist postural muscles compared to TD. These differences are important to consider when designing rehabilitation programs to improve posture and movement control in children with hemiplegic and diplegic cerebral palsy.

[PMID: 27324084](#)

3. Gait Posture. 2016 Jun 17;48:243-248. doi: 10.1016/j.gaitpost.2016.06.015. [Epub ahead of print]

Gait characteristics, balance performance and falls in ambulant adults with cerebral palsy: An observational study.

Morgan P, Murphy A, Opheim A, McGinley J.

The relationship between spatiotemporal gait parameters, balance performance and falls history was investigated in ambulant adults with cerebral palsy (CP). Participants completed a single assessment of gait using an instrumented walkway at preferred and fast speeds, balance testing (Balance Evaluation Systems Test; BESTest), and reported falls history. Seventeen ambulatory adults with CP, mean age 37 years, participated. Gait speed was typically slow at both preferred and fast speeds (mean 0.97 and 1.21m/s, respectively), with short stride length and high cadence relative to speed. There was a significant, large positive relationship between preferred gait speed and BESTest total score ($\rho=0.573$; $p<0.05$) and fast gait speed and BESTest total score ($\rho=0.647$, $p<0.01$). The stride lengths of fallers at both preferred and fast speeds differed significantly from non-fallers ($p=0.032$ and $p=0.025$, respectively), with those with a prior history of falls taking shorter strides. Faster gait speed was associated with better performance on tests of anticipatory and postural response components of the BESTest, suggesting potential therapeutic training targets to address either gait speed or balance performance. Future exploration of the implications of slow walking speed and reduced stride length on falls and community engagement, and the potential prognostic value of stride length on identifying falls risk is recommended.

[PMID: 27341531](#)

4. NeuroRehabilitation. 2016 Jun 23. [Epub ahead of print]

Effect of supporting 3D-garment on gait postural stability in children with bilateral spastic cerebral palsy.

Degelaen M, De Borre L, Buyl R, Kerckhofs E, De Meirleir L, Dan B.

BACKGROUND: Children with cerebral palsy show dysfunctional postural control which interferes with their functional performance and daily-life activities. **OBJECTIVE:** The aim of the study was to identify the effect of a 3D supporting garment on trunk postural control and interjoint coordination during gait in children with bilateral cerebral palsy. **METHODS:** We analyzed tridimensional trunk motion, trunk-thigh and interjoint coordination in 15 4-10 year-old children with bilateral spastic cerebral palsy (GMFCS I or II) and 16 4-10 year-old typically developing children while walking with or without a supporting garment. **RESULTS:** We found significantly changes in the coordination between trunk and lower limbs in children with cerebral palsy. Step velocity and cadence both increased significantly in children with cerebral palsy but in controls, the cadence remained unaltered. Interojoint coordination between hip-knee and knee-ankle was altered during the stance phase only in the subgroup of children with cerebral palsy without any limitations in ankle joint passive range of motion. **CONCLUSION:** 3D supporting garments improve trunk-thigh and lower limb interjoint coordination in walking in children with bilateral cerebral palsy.

[PMID: 27341370](#)

5. *Pediatr Phys Ther.* 2016 Fall;28(3):285-93. doi: 10.1097/PEP.0000000000000273.

Effect of Segmental Trunk Support on Posture and Reaching in Children With Cerebral Palsy.

Santamaria V, Rachwani J, Saavedra S, Woollacott M.

PURPOSE: To test the effects of segmental trunk support on seated postural and reaching control in children with cerebral palsy. **METHODS:** Seventeen children (age range 2-15 y, Gross Motor Function Classification System levels III-V) were classified with the Segmental Assessment of Trunk Control into mild (complete trunk control/lower lumbar deficits), moderate (thoracic/upper lumbar deficits), and severe (cervical/upper thoracic deficits). Postural and arm kinematics were measured while reaching with trunk support at axillae, mid-ribs, or pelvis. **RESULTS:** Children in the mild group did not display changes in posture or reaching across conditions. The moderately involved group showed decrements in postural and reaching performance with pelvic compared with higher supports ($P < .01$). Children in the severe group were unable to maintain posture with pelvic support and showed postural deficiencies with mid-ribs compared with axillae support ($P < .01$). **CONCLUSIONS:** Children with cerebral palsy and trunk dysfunction demonstrate improved motor performance when the external assistance matches their intrinsic level of trunk control.

[PMID: 27341576](#)

6. *Pediatr Phys Ther.* 2016 Fall;28(3):293. doi: 10.1097/PEP.0000000000000278.

Commentary on "Effect of Segmental Trunk Control on Posture and Reaching in Children With Cerebral Palsy".

Kendall E, Cahan C.

[PMID: 27341577](#)

7. *J Child Orthop.* 2016 Jun 18. [Epub ahead of print]

Windswept hip deformity in children with cerebral palsy: a population-based prospective follow-up.

Häggglund G, Lauge-Pedersen H, Persson Bunke M, Rodby-Bousquet E.

PURPOSE: To analyze the development of windswept hip deformity (WS) in a total population of children with cerebral palsy (CP) up to 20 years of age, the association between WS and hip dislocation, and femoral varus osteotomy and scoliosis, and the impact of a hip surveillance program on the subsequent incidence of WS. **METHODS:** This is a prospective study on children with CP in southern Sweden included in the Swedish follow-up programme and registry for CP (CPUP). All children born between 1990 and 1995 with CP were included; those born between 1990 and 1991 did not partake in the hip surveillance program until they were older (3-5 years of age) and served as a historic control group. Children born between 1992 and 1995 were included in the hip surveillance program from about 2 years of age and constituted the study group. **RESULTS:** In the control group, 12 of 68 children (18 %) developed WS. In the study group of 139 children, 13 (9 %) developed WS ($p = 0.071$). Of all 25 children with WS, 21 also developed scoliosis and 5 developed a hip dislocation. The number of children with WS starting in the lower extremities was significantly lower in the study group ($p = 0.028$). No difference between the two groups was seen regarding WS that started in combination with scoliosis. **CONCLUSION:** With early inclusion in a hip surveillance program and early treatment of contractures, it appears possible to reduce the frequency of WS starting in the lower extremities.

[PMID: 27318818](#)

8. Phys Ther Sport. 2016 Jul;20:1-6. doi: 10.1016/j.ptsp.2015.10.004. Epub 2015 Oct 21.

Bilateral muscle strength symmetry and performance are improved following walk training with restricted blood flow in an elite paralympic sprint runner: Case study.

Salvador AF, Schubert KR, Cruz RS, Corvino RB, Pereira KL, Caputo F, de Oliveira MF.

OBJECTIVES: Investigate the influence of 4 weeks of walk training with blood flow restriction (BFR) on muscle strength, metabolic responses, 100-m and 400-m performances in an athlete with cerebral palsy. **METHODS:** An elite Paralympic sprinter (20 years, 176 cm, 64.8 kg) who presented with moderate hemiplegic cerebral palsy (right side impaired) completed four visits before and after 4 weeks of the BFR training: 1) anthropometric measurements, familiarization of maximal voluntary contraction (MVC), and an incremental test; 2) MVC measurements; 3) 400-m performance, and 4) 100-m performance. The walk training with BFR consisted of four bouts of 5 min at 40% of maximal aerobic speed with 1 min of passive rest with complete reperfusion. **RESULTS:** All performance times were lower with training (100-m: 1%; 400-m: 10%), accompanied by adaptations in aerobic variables ($\dot{V}O_{2\max}$: 6%; OBLA: 24%) and running economy (9-10%). Lactic acid energy metabolism was reduced (25-27%), even in the presence of a higher lactate efflux from the previously active muscles after training. MVC (right leg: 19%; left leg: 9%) increased in both legs unevenly, decreasing the muscle strength asymmetry between limbs. **CONCLUSIONS:** These results indicate that cardiovascular and neuromuscular adaptations can be simultaneously induced following BFR training in a paralympic sprinter.

[PMID: 27325532](#)

9. Res Dev Disabil. 2016 Jun 20;56:183-196. doi: 10.1016/j.ridd.2016.06.003. [Epub ahead of print]

The impact of strength training on skeletal muscle morphology and architecture in children and adolescents with spastic cerebral palsy: A systematic review.

Gillett JG, Boyd RN, Carty CP, Barber LA.

AIM: The aim of this study was to systematically review the current literature to determine the impact of strength training on skeletal muscle morphology and architecture in individuals aged 4-20 years with spastic type cerebral palsy. **METHODS:** A comprehensive search for randomised and non-randomised controlled trials, cohort studies and cross-comparison trials was performed on five electronic databases. Included studies were graded according to level of evidence and assessed for methodological quality using the Downs and Black scale. Quantitative data was analysed using effect sizes. **RESULTS:** Six of 304 articles met the inclusion criteria. Methodological quality of the included papers ranged from 14 to 19 (out of 32). A large effect was found on muscle cross-sectional area following strength training, with small to moderate effects on muscle volume and thickness. **CONCLUSION AND IMPLICATIONS:** There is preliminary evidence that strength training leads to hypertrophy in children and adolescents with CP. A paucity of studies exist measuring morphological and architectural parameters following strength training in these individuals. Overall low study methodological quality along with heterogeneous study design, dissimilar outcome measures, and lack of adequate control groups, indicated that care is needed when interpreting the results of these studies in isolation.

[PMID: 27337690](#)

10. J Neurosurg Pediatr. 2016 Jun 24:1-6. [Epub ahead of print]

Comparison between an Ascenda and a silicone catheter in intrathecal baclofen therapy in pediatric patients: analysis of complications.

Motta F, Antonello CE.

OBJECTIVE In this single-center study the authors investigated the complications occurring before and after the introduction of the new Ascenda intrathecal catheter (Medtronic Inc.) in pediatric patients treated with intrathecal baclofen therapy (ITB) for spasticity and/or dystonia. **METHODS** This was a retrospective review of 508 children who had received ITB, 416 with silicone catheters in the 13 years between September 1998 and September 2011 and 92 with Ascenda catheters in the 3 years between September 2011 and August 2014. The authors evaluated major complications such as infections, CSF leaks treated, and problems related to the catheter or pump, and they compared the 2 groups of patients who had received either a silicone catheter or an Ascenda catheter implant. **RESULTS** One hundred twenty patients in the silicone group (29%) and 1 patient in

the Ascenda group (1.1%; $p < 0.001$) had a major complication. In the silicone group 23 patients (5.5%) were affected by CSF leakage and 75 patients (18%) experienced 82 catheter-related events, such as occlusion, dislodgment, disconnection, or breakage, which required catheter replacement. In the Ascenda group, only 1 patient (1.1%) was affected by CSF leakage. CONCLUSIONS To the authors' knowledge, this study is the first in the literature to compare the performance of the new Ascenda catheter, introduced in 2011, with the traditional silicone catheter for intrathecal drug infusion. In their analysis, the authors found that the Ascenda catheter can reduce major complications related to the catheter after ITB pump implantation. Further investigation is necessary to expand on and confirm their results.

[PMID: 27341610](#)

11. Behav Sci (Basel). 2016 Jun 7;6(2). pii: E10. doi: 10.3390/bs6020010.

Using Free Internet Videogames in Upper Extremity Motor Training for Children with Cerebral Palsy.

Sevick M, Eklund E, Mensch A, Foreman M, Standeven J, Engsborg J.

Movement therapy is one type of upper extremity intervention for children with cerebral palsy (CP) to improve function. It requires high-intensity, repetitive and task-specific training. Tedium and lack of motivation are substantial barriers to completing the training. An approach to overcome these barriers is to couple the movement therapy with videogames. This investigation: (1) tested the feasibility of delivering a free Internet videogame upper extremity motor intervention to four children with CP (aged 8-17 years) with mild to moderate limitations to upper limb function; and (2) determined the level of intrinsic motivation during the intervention. The intervention used free Internet videogames in conjunction with the Microsoft Kinect motion sensor and the Flexible Action and Articulated Skeleton Toolkit software (FAAST) software. Results indicated that the intervention could be successfully delivered in the laboratory and the home, and pre- and post- impairment, function and performance assessments were possible. Results also indicated a high level of motivation among the participants. It was concluded that the use of inexpensive hardware and software in conjunction with free Internet videogames has the potential to be very motivating in helping to improve the upper extremity abilities of children with CP. Future work should include results from additional participants and from a control group in a randomized controlled trial to establish efficacy.

[PMID: 27338485](#)

12. Pediatr Phys Ther. 2016 Fall;28(3):354. doi: 10.1097/PEP.0000000000000287.

Commentary on "Effect of Knee Orthoses on Hamstring Contracture in Children With Cerebral Palsy: Multiple Single-Subject Study".

Le Cras S, Greve K.

[PMID: 27341586](#)

13. Dev Med Child Neurol. 2016 Jun 21. doi: 10.1111/dmcn.13188. [Epub ahead of print]

Creating a neuroimaging classification system for children with cerebral palsy.

[No abstract available]

Ditchfield M.

[PMID: 27325401](#)

14. Dev Med Child Neurol. 2016 Jun 21. doi: 10.1111/dmcn.13166. [Epub ahead of print]

MRI classification system (MRICS) for children with cerebral palsy: development, reliability, and recommendations.

Himmelmann K, Horber V, De La Cruz J, Horridge K, Mejaski-Bosnjak V, Hollody K, Krägeloh-Mann I; SCPE Working Group.

AIM: To develop and evaluate a classification system for magnetic resonance imaging (MRI) findings of children with cerebral palsy (CP) that can be used in CP registers. METHOD: The classification system was based on pathogenic patterns occurring in different periods of brain development. The MRI classification system (MRICS) consists of five main groups: maldevelopments, predominant white matter injury, predominant grey matter injury, miscellaneous, and normal findings. A detailed manual for the descriptions of these patterns was developed, including test cases (www.scpenetwork.eu/en/my-scpe/rtn/neuroimaging/cp-neuroimaging/). A literature review was performed and MRICS was compared with other classification systems. An exercise was carried out to check applicability and interrater reliability. Professionals working with children with CP or in CP registers were invited to participate in the exercise and chose to classify either 18 MRIs or MRI reports of children with CP. RESULTS: Classification systems in the literature were compatible with MRICS and harmonization possible. Interrater reliability was found to be good overall ($k=0.69$; $0.54-0.82$) among the 41 participants and very good ($k=0.81$; $0.74-0.92$) using the classification based on imaging reports. INTERPRETATION: Surveillance of Cerebral Palsy in Europe (SCPE) proposes the MRICS as a reliable tool. Together with its manual it is simple to apply for CP registers.

[PMID: 27325153](#)

15. Eur J Sport Sci. 2016 Jun 22:1-10. [Epub ahead of print]

Paralympic athletes' perceptions of their experiences of sports-related injuries, risk factors and preventive possibilities.

Fagher K, Forsberg A, Jacobsson J, Timpka T, Dahlström Ö, Lexell J.

Our knowledge of sports-related injuries in para-sport is limited and there are no data on how Paralympic athletes themselves perceive an injury. The aim of this qualitative study was to explore Paralympic athletes' perceptions of their experiences of sports-related injuries, risk factors and preventive possibilities. Eighteen Swedish Paralympic athletes with vision impairment, intellectual impairment, spinal cord injury, cerebral palsy, myelomeningocele, dysplasia and neuromuscular disorder, representing 10 different para-sports, were interviewed. The qualitative phenomenographic method was used to interpret the data. The analysis revealed nine categories of perceptions of experiences. The athletes perceived that their impairments were involved in the cause and consequential chains associated with a sports-related injury. Other categories that denoted and described these injuries were: sport overuse, risk behaviour, functional limitations, psychological stressors, the normalised pain, health hazards, individual possibilities to prevent sports-related injuries and unequal prerequisites. This qualitative study revealed that Paralympic athletes' perceptions of their experiences of sports-related injuries are complex and multifactorial, and in several ways differ from able-bodied athletes. This needs to be considered in the sports health and safety work within the Paralympic Movement as well as in the design of future injury surveillance systems and preventive programmes.

[PMID: 27329262](#)

16. Res Dev Disabil. 2016 Jun 16;56:165-176. doi: 10.1016/j.ridd.2016.06.001. [Epub ahead of print]

Teaching phonics to groups of middle school students with autism, intellectual disabilities and complex communication needs.

Ainsworth MK, Evmenova AS, Behrmann M, Jerome M.

For students who have severe and multiple disabilities including intellectual disability, complex communication needs, physical and/or sensory disabilities, and autism, there are many barriers to literacy acquisition. The purpose of this study was to teach letter-sound correspondence to small groups of students with significant intellectual disabilities and comorbid communication disorders using the ALL (Accessible Literacy Learning) curriculum. The eight participants in this study, who ranged in age from 11 to 16 years of age and had primary diagnoses of cerebral palsy, autism, Rett syndrome, Down syndrome, and intellectual disability, were placed into four groups for instruction in phonics. The instruction followed the scripted lessons of

ALL Curriculum. There was moderate evidence of the functional relation between the use of the ALL Curriculum and participants' progress towards letter-sound correspondence. Each group of participants demonstrated an increased performance in the treatment phase. The results of the visual analysis were supported by the statistically significant differences yielded by the randomization test analysis. Implications are discussed in terms of the importance of literacy instruction for students with all abilities and needs.

[PMID: 27318612](#)

17. *Vopr Kurortol Fizioter Lech Fiz Kult.* 2016 Mar-Apr;93(2):53-8.

[The informational technologies for the comprehensive rehabilitation of the patients presenting with juvenile cerebral palsy (a review)].

[Article in Russian]

Legkaya EF, Khodasevich LS, Polyakova AV.

This article is devoted to the application of the up-to-date technologies for the treatment and rehabilitation of the children presenting with juvenile cerebral palsy (JCP). It is shown that the use of computer classes, play therapy toys, and robotic exercise machines collectively make up a promising tool for the correction of limb movements in the JCP patients. Lessons with the use of modified technical devices make it possible to develop the creative capacities of the children, improve memory, attention, coordination and precision of the movements of their extremities. One of the important components of the comprehensive rehabilitation of the patients suffering from juvenile cerebral palsy is teaching. It is concluded that the informational technologies provide a powerful tool for remote learning to enable the invalid children to receive education in the future.

[PMID: 27340721](#)

Prevention and Cure

18. *J Pediatr.* 2016 Jun 15. pii: S0022-3476(16)30235-9. doi: 10.1016/j.jpeds.2016.05.027. [Epub ahead of print]

Effect of Intra- and Extrauterine Growth on Long-Term Neurologic Outcomes of Very Preterm Infants.

Guellec I, Lapillonne A, Marret S, Picaud JC, Mitanchez D, Charkaluk ML, Fresson J, Arnaud C, Flamand C, Cambonie G, Kaminski M, Roze JC, Ancel PY; Étude Épidémiologique sur les Petits Âges Gestationnels (EPIPAGE; [Epidemiological Study on Small Gestational Ages]) Study Group.

OBJECTIVE: To determine whether extrauterine growth is associated with neurologic outcomes and if this association varies by prenatal growth profile. **STUDY DESIGN:** For 1493 preterms from the EPIPAGE (Étude Épidémiologique sur les Petits Âges Gestationnels [Epidemiological Study on Small Gestational Ages]) cohort, appropriate for gestational-age (AGA) was defined by birth weight >-2 SD and small for gestational-age (SGA) by birth weight ≤-2 SD. Extra-uterine growth was defined by weight gain or loss between birth and 6 months by z-score change. Growth following-the-curve (FTC) was defined as weight change -1 to $+1$ SD, catch-down-growth (CD) as weight loss ≥ 1 SD, and catch-up-growth (CU) as weight gain ≥ 1 SD. At 5 years, a complete medical examination ($n = 1305$) and cognitive evaluation with the Kauffman Assessment Battery for Children ($n = 1130$) were performed. Behavioral difficulties at 5 years and school performance at 8 years were assessed ($n = 1095$). **RESULTS:** Overall, 42.5% of preterms were AGA-FTC, 20.2% AGA-CD, 17.1% AGA-CU, 5.6% SGA-FTC, and 14.5% SGA-CU. Outcomes did not differ between CU and FTC preterm AGA infants. Risk of cerebral palsy was greater for AGA-CD compared with AGA-FTC (aOR 2.26 [95% CI 1.37-3.72]). As compared with children with SGA-CU, SGA-FTC children showed no significant increased risk of cognitive deficiency (aOR 1.41 [0.94-2.12]) or school difficulties (aOR 1.60 [0.84-3.03]). Compared with AGA-FTC, SGA showed increased risk of cognitive deficiency (SGA-FTC aOR 2.19 [1.25-3.84]) and inattention-hyperactivity (SGA-CU aOR 1.65 [1.05-2.60]). **CONCLUSION:** Deficient postnatal growth was associated with poor neurologic outcome for AGA and SGA preterm infants. CU growth does not add additional benefits. Regardless of type of postnatal growth, SGA infants showed behavioral problems and cognitive deficiency.

[PMID: 27318373](#)

19. J Paediatr Child Health. 2016 Jun;52(6):669-71. doi: 10.1111/jpc.13200.

Cerebral palsy is not a diagnosis: A case report of a novel atlastin-1 mutation.

[No abstract available]

Andersen EW, Leventer RJ, Reddihough DS, Davis MR, Ryan MM.

[PMID: 27333849](#)

20. Neuroimage Clin. 2016 May 29;11:751-9. doi: 10.1016/j.nicl.2016.05.018. eCollection 2016.

Automated, quantitative measures of grey and white matter lesion burden correlates with motor and cognitive function in children with unilateral cerebral palsy.

Pagnozzi AM, Dowson N, Doecke J, Fiori S, Bradley AP, Boyd RN, Rose S.

White and grey matter lesions are the most prevalent type of injury observable in the Magnetic Resonance Images (MRIs) of children with cerebral palsy (CP). Previous studies investigating the impact of lesions in children with CP have been qualitative, limited by the lack of automated segmentation approaches in this setting. As a result, the quantitative relationship between lesion burden has yet to be established. In this study, we perform automatic lesion segmentation on a large cohort of data (107 children with unilateral CP and 18 healthy children) with a new, validated method for segmenting both white matter (WM) and grey matter (GM) lesions. The method has better accuracy (94%) than the best current methods (73%), and only requires standard structural MRI sequences. Anatomical lesion burdens most predictive of clinical scores of motor, cognitive, visual and communicative function were identified using the Least Absolute Shrinkage and Selection operator (LASSO). The improved segmentations enabled identification of significant correlations between regional lesion burden and clinical performance, which conform to known structure-function relationships. Model performance was validated in an independent test set, with significant correlations observed for both WM and GM regional lesion burden with motor function ($p < 0.008$), and between WM and GM lesions alone with cognitive and visual function respectively ($p < 0.008$). The significant correlation of GM lesions with functional outcome highlights the serious implications GM lesions, in addition to WM lesions, have for prognosis, and the utility of structural MRI alone for quantifying lesion burden and planning therapy interventions.

[PMID: 27330975](#)