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Interventions and Management

1. Gait event detection using kinematic data in children with bilateral spastic cerebral palsy

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Clin Biomech (Bristol, Avon). 2021 Sep 25;90:105492. doi: 10.1016/j.clinbiomech.2021.105492. Online ahead of print.

Background: Ground reaction forces are the gold standard for detecting gait events, but they are not always applicable in cerebral palsy. Ghousayni's algorithm is an event detection method based on the sagittal plane velocity of heel and toe markers. We aimed to evaluate whether Ghousayni's algorithm, using two different thresholds, was a valid event detection method in children with bilateral spastic cerebral palsy. We also aimed to define a new adaptation of Ghousayni's algorithm for detecting foot strike in cerebral palsy, and study the effect of event detection methods on spatiotemporal parameters. **Methods:** Synchronized kinematic and kinetic data were collected retrospectively from 16 children with bilateral spastic cerebral palsy (7 males and 9 females; age 8.9 ± 2.7 years) walking barefoot at self-selected speed. Gait events were detected using methods: 1) ground reaction forces, 2) Ghousayni's algorithm with a threshold of 0.5 m/s, and 3) Ghousayni's algorithm with a walking speed dependent threshold. The new adaptation distinguished how foot strikes were performed (heel and/or toe) comparing the timing when the foot markers velocities fell below the threshold. Differences between the three methods, and between spatiotemporal parameters calculated from the two Ghousayni's thresholds were analyzed. **Findings:** There were statistically significant ($P < 0.05$) differences between methods 1 and 3, and between some spatiotemporal parameters calculated from methods 2 and 3. Ghousayni's algorithm showed better performance for foot strike than for toe off. **Interpretation:** Ghousayni's algorithm using 0.5 m/s is valid in children with bilateral spastic cerebral palsy. Event detection methods affect spatiotemporal parameters.

PMID: [34627071](https://pubmed.ncbi.nlm.nih.gov/34627071/)

2. Effects of 12-week aquatic exercises on gross motor function, swimming skills and walking ability in children with cerebral palsy

Bojan Jorgić, Lidija Dimitrijević, Marko Aleksandrović, Marija Bratić, Zoran Milanović

Minerva Pediatr (Torino). 2021 Oct 14. doi: 10.23736/S2724-5276.21.05896-1. Online ahead of print.

Background: Cerebral palsy (CP) is the most common cause of physical disability in childhood defined as a group of permanent disorders of movement. The aim of this study was to determine the effects of 12-week aquatic exercise program on gross motor function, swimming skills, and walking ability in children with cerebral palsy. **Methods:** Eighteen children (Mean \pm SD age: 12.3 ± 3 years) with cerebral palsy classified at Levels I, II and III on the Gross Motor Function Classification System were allocated to one group, where the first 12 weeks were a control period while another 12 weeks were an

experimental period. The participants underwent the same battery of tests focusing gross motor function, swimming skills, and walking ability on three occasions. Results: Control period was stable with no significant changes in any of measurements. After the 12-week experimental program, a statistically significant improvement was determined in gross motor function ($p=0.005$), swimming skills ($p=0.000$), walking endurance and walking ($p=0.000$). No significant differences ($p>0.05$) were observed for walking efficiency. Conclusions: The 12-week aquatic exercise program (3/week, 60 minutes), combining Halliwick method, swimming and walking activities may improve the gross motor function, swimming skills, walking endurance and velocity in ambulatory children with cerebral palsy.

PMID: [34647700](#)

3. Factors associated with oropharyngeal dysphagia diagnosed by videofluoroscopy in children with cerebral palsy

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Rev Gastroenterol Mex (Engl Ed). 2021 Oct 8;S2255-534X(21)00102-X. doi: 10.1016/j.rgmxen.2020.09.004. Online ahead of print.

Introduction and aims: Oropharyngeal dysphagia (OD) occurs in children with cerebral palsy. It is important to investigate its relationship with some variables, and the objective of this study was to identify factors associated with OD. Materials and methods: Case-control study in patients with cerebral palsy from 8 months to 15 years of age, from November 2018 to November 2019, approved by the Ethics Committee. The diagnosis of OD was made by videofluoroscopy when there was nasopharyngeal reflux, stagnation in the vallecular sinuses, in the piriformis sinuses, penetration, and aspiration. The independent variables were type of cerebral palsy, gross motor impairment classified into five levels, nutritional status and comorbidities. One case with OD was included and the next one without alterations in videofluoroscopy was control. The variables were compared with Chi square and Student's t. The association was measured with odds ratio. The confidence interval was 95%. Results: Thirty patients with OD and 30 without OD were studied. Sex, age, birth weight, and gestational age had a similar distribution in the two groups. From the data perceived by the mothers at the time of feeding, the greater frequency of the difficulty in the transfer of the food bolus in the group with OD showed a statistically significant difference ($P<.001$) and of the studied factors, the level V of the gross motor involvement was associated with a higher frequency of OD. Conclusions: OD was associated with level V of gross motor involvement.

PMID: [34635447](#)

4. Caregivers' Feeding Experiences and Support of Their Child with Cerebral Palsy

Christine Taylor, Ariana C Kong, Jann Foster, Nadia Badawi, Iona Novak

J Child Fam Stud. 2021 Oct 4;1-12. doi: 10.1007/s10826-021-02123-x. Online ahead of print.

Feeding difficulties are often reported in children with cerebral palsy (CP) and are associated with caregiver stress. This study explored the feeding experiences and support of caregivers with children who have CP. A qualitative approach was used where semi-structured telephone interviews were conducted and audio recorded. Thematic analysis was used to code and analyse the transcribed interview data from the eleven mothers that participated. Four major themes were identified from the data: Child-centred world, Making decisions, Knowing their child, and Seeking and receiving support. Caregivers knew their child's unique needs and made daily decisions around feeding based upon the child's feedback and changing condition. Family support was viewed as important, although the caregivers still reported feeling stressed. Health professional support varied from "amazing" to "frustrating", which contributed to the caregivers' stress. However, no single support strategy was appropriate as their needs or preferences varied. It is recommended that health professionals take an individualised partnership approach with caregivers and their child, with particular attention to those caregivers who lack a friend or family support and those who are physically isolated.

PMID: [34629833](#)

5. Virtual Reality-Incorporated Horse Riding Simulator to Improve Motor Function and Balance in Children with Cerebral Palsy: A Pilot Study

Hyun Jung Chang, Yong Gi Jung, Young Sook Park, Se Hwi O, Da Hye Kim, Chang Woo Kim

Sensors (Basel). 2021 Sep 24;21(19):6394. doi: 10.3390/s21196394.

The horse riding simulator (HRS) reportedly has a beneficial effect on motor function and balance in children with cerebral palsy (CP). However, by itself, the HRS is not a sufficient source of challenge and motivation for children. To address this issue, we combined the HRS with virtual reality (VR) to promote somatosensory stimulation and motivation. Sixteen children (ages: 5-17 years) with CP and presenting Gross Motor Function Classification System (GMFCS) levels I-IV were enrolled in the study. Using a head-mounted display and controllers, interventions were carried out over 30-min periods (two rides lasting 12 min each, along with a six-min rest period) twice a week over a period of eight weeks (16 sessions in aggregate). The Pediatric Balance Scale (PBS), Gross Motor Function measure (GMFM)-88, and GMFM-66 scores of each participant were measured before and after the interventions. Statistically significant improvements were observed in the PBS, GMFM-66, the total GMFM-88 scores, and those corresponding to dimensions D and E of GMFM-88 after the intervention ($p < 0.05$). This study demonstrates that VR-incorporated HRS is effective in improving motor function and balance in children with CP and that its incorporation in conventional PT programs could yield beneficial results.

PMID: [34640713](#)

6. Intensive Training with Virtual Reality on Mobility in Adolescents with Cerebral Palsy-Single Subject Design

Elisa Valenzuela, Renata Rosa, Carlos Monteiro, Leslie Keniston, Kênea Ayupe, Jaqueline Frônio, Paula Chagas

Int J Environ Res Public Health. 2021 Oct 5;18(19):10455. doi: 10.3390/ijerph181910455.

Purpose: To evaluate the effects of a short-term intensive virtual reality intervention in adolescents with cerebral palsy (CP). Methods: Single-subject design, type A-B-follow-up, with four participants (P) with CP, 15-18 years, GMFCS level II. A two-week intervention phase was performed with twelve Nintendo® Wii games in six sessions (90 min) per week. Outcome variables were semi-static balance (Pressure Center Oscillation-PCO), gait speed (Ten Meter Walk Test at usual speed-TMWT-U; and fast speed-TMWT-F), mobility (Timed Up and Go test-TUG), endurance (sit-to-stand test 5 times-STS-5), and gross motor activity (Gross Motor Function Measure-GMFM). Results: Statistical improvements were observed in GMFM-D (P2-P3), TMWT-F (P2-P3-P4) and TMWT-U (P2), STS-5 (P3-P4), TUG (P3), and PCO (P2-P3), assessed by level, trend, latency, and visual inspection to analyze change. Conclusions: This study shows that a short-term intensive intervention using Nintendo® Wii-based games in adolescents, GMFCS level II, can be an effective therapy, leading to some recovery of functioning in these young people.

PMID: [34639757](#)

7. Efficacy of early interventions with active parent implementation in low-and-Middle income countries for young children with cerebral palsy to improve child development and parent mental health outcomes: a systematic review

Nataya Branjerdporn, Katherine Benfer, Emma Crawford, Jenny Ziviani, Roslyn N Boyd, Leanne Sakzewski

Disabil Rehabil. 2021 Oct 14;1-15. doi: 10.1080/09638288.2021.1989063. Online ahead of print.

Purpose: To determine the efficacy of interventions with active parent implementation for young children with cerebral palsy (CP) to improve child and parent outcomes in low-middle income countries (LMICs). Methods: Five databases were systematically searched. Randomised or comparison studies evaluating interventions with the training of the parent and/or home practice components to implement with their child with CP (<60 months of age) were included. The modified Downs and Black scale assessed methodological quality. Data were pooled to calculate mean differences and 95% confidence intervals (95% CI). Results: Searches yielded 189 unique articles. 11 studies from ten papers of moderate to high quality were included. Parent-implemented general developmental interventions had a small negative effect on gross motor function compared to interventionist-implemented therapy. Parent-implemented upper limb training compared to interventionist-implemented neurodevelopmental therapy had a small positive effect on bimanual hand function. Parent-implemented functional feeding training had a large significant effect on chewing function compared to parent-implemented oral motor exercises. Parent-

implemented interventions targeting general child development and feeding had mixed effects on parent stress outcomes. Conclusions: Parent-implemented interventions in LMICs are promising to improve child bimanual hand and chewing function. Further research evaluating the efficacy of parent-implemented interventions to improve parent mental health is needed. Implications for Rehabilitation: Intensive motor training-based interventions with active parent implementation were effective to improve child gross motor, bimanual hand, and chewing function in young children with CP compared to passive, generic interventionist-implemented or health education interventions. Interventions with active parent implementation had mixed results to improve parent mental health, however, this was frequently not assessed. A consistent level of support and training provided to parents may be required to have a positive effect on parent stress. To further understand the feasibility of early interventions with active parent implementation in LMICs, data on adherence to home practice dose and session attendance and a qualitative understanding of contextual and child factors influencing parent implementation is needed.

PMID: [34647839](#)

8. Just how internationally relevant can evidence-based cerebral palsy clinical practice guidelines be?

Gillian Saloojee

Dev Med Child Neurol. 2021 Oct 10. doi: 10.1111/dmcn.15086. Online ahead of print.

PMID: [34632568](#)

9. Bi-allelic variants in SPATA5L1 lead to intellectual disability, spastic-dystonic cerebral palsy, epilepsy, and hearing loss

Elodie M Richard, Somayeh Bakhtiari, Ashley P L Marsh, Rauan Kaiyrzhanov, Matias Wagner, Sheetal Shetty, Alex Pagnozzi, Sandra M Nordlie, Brandon S Guida, Patricia Cornejo, Helen Magee, James Liu, Bethany Y Norton, Richard I Webster, Lisa Worgan, Hakon Hakonarson, Jiankang Li, Yiran Guo, Mahim Jain, Alyssa Blesson, Lance H Rodan, Mary-Alice Abbott, Anne Comi, Julie S Cohen, Bader Alhaddad, Thomas Meitinger, Dominic Lenz, Andreas Ziegler, Urania Kotzaeridou, Theresa Brune, Anna Chassevent, Constance Smith-Hicks, Joseph Ekstein, Tzvi Weiden, Andreas Hahn, Nazira Zharkinbekova, Peter Turnpenny, Arianna Tucci, Melissa Yelton, Rita Horvath, Serdal Gungor, Semra Hiz, Yavuz Oktay, Hanns Lochmuller, Marcella Zollino, Manuela Morleo, Giuseppe Marangi, Vincenzo Nigro, Annalaura Torella, Michele Pinelli, Simona Amenta, Ralf A Husain, Benita Grossmann, Marion Rapp, Claudia Steen, Iris Marquardt, Mona Grimmel, Ute Grasshoff, G Christoph Korenke, Marta Owczarek-Lipska, John Neidhardt, Francesca Clementina Radio, Cecilia Mancini, Dianela Judith Claps Sepulveda, Kirsty McWalter, Amber Begtrup, Amy Crunk, Maria J Guillen Sacoto, Richard Person, Rhonda E Schnur, Maria Margherita Mancardi, Florian Kreuder, Pasquale Striano, Federico Zara, Wendy K Chung, Warren A Marks, Clare L van Eyk, Dani L Webber, Mark A Corbett, Kelly Harper, Jesia G Berry, Alastair H MacLennan, Jozef Gecz, Marco Tartaglia, Vincenzo Salpietro, John Christodoulou, Jan Kaslin, Sergio Padilla-Lopez, Kaya Bilguvar, Alexander Munchau, Zubair M Ahmed, Robert B Hufnagel, Michael C Fahey, Reza Maroofian, Henry Houlden, Heinrich Sticht, Shrikant M Mane, Aboufazel Rad, Barbara Vona, Sheng Chih Jin, Tobias B Haack, Christine Makowski, Yoel Hirsch, Saima Riazuddin, Michael C Kruer

Am J Hum Genet. 2021 Oct 7;108(10):2006-2016. doi: 10.1016/j.ajhg.2021.08.003.

Spermatogenesis-associated 5 like 1 (SPATA5L1) represents an orphan gene encoding a protein of unknown function. We report 28 bi-allelic variants in SPATA5L1 associated with sensorineural hearing loss in 47 individuals from 28 (26 unrelated) families. In addition, 25/47 affected individuals (53%) presented with microcephaly, developmental delay/intellectual disability, cerebral palsy, and/or epilepsy. Modeling indicated damaging effect of variants on the protein, largely via destabilizing effects on protein domains. Brain imaging revealed diminished cerebral volume, thin corpus callosum, and periventricular leukomalacia, and quantitative volumetry demonstrated significantly diminished white matter volumes in several individuals. Immunofluorescent imaging in rat hippocampal neurons revealed localization of Spata5l1 in neuronal and glial cell nuclei and more prominent expression in neurons. In the rodent inner ear, Spata5l1 is expressed in the neurosensory hair cells and inner ear supporting cells. Transcriptomic analysis performed with fibroblasts from affected individuals was able to distinguish affected from controls by principal components. Analysis of differentially expressed genes and networks suggested a role for SPATA5L1 in cell surface adhesion receptor function, intracellular focal adhesions, and DNA replication and mitosis. Collectively, our results indicate that bi-allelic SPATA5L1 variants lead to a human disease characterized by sensorineural hearing loss (SNHL) with or without a nonprogressive mixed neurodevelopmental phenotype.

PMID: [34626583](#)

10. [Effect of acupuncture combined with rehabilitation training on cognitive function and amino acid metabolism in children with cerebral palsy][Article in Chinese]

Dong Chen, Chao Bao, Meng-Qian Yuan, Yan-Xia Geng, Jian-Bing Li, Yan-Cai Li, Nan Wang, Ying Wang, Wei-Wei Ruan, Qin Zou, Bin Xu

Randomized Controlled Trial Zhongguo Zhen Jiu. 2021 Oct 12;41(10):1095-102. doi: 10.13703/j.0255-2930.20210129-k0008.

Objective: To observe the effect of acupuncture combined with rehabilitation training on cognitive function and amino acid metabolism in children with cerebral palsy. **Methods:** Twenty children with cerebral palsy (cerebral palsy group) were randomly divided into an acupuncture and rehabilitation group (11 cases) and a rehabilitation group (9 cases), and 10 healthy children were included as the normal group. The rehabilitation group was treated with rehabilitation training, 30 min each time; on the basis of rehabilitation training, the acupuncture and rehabilitation group was treated with acupuncture at Sishenzhen, Zhisanzhen, Naosanzhen, Niesanzhen, Dazhui (GV 14), Shenzhu (GV 12), Mingmen (GV 4), etc. The Sishenzhen (left and right points) and the ipsilateral Niesanzhen were respectively connected with a group of electrodes, intermittent wave, frequency of 2 Hz for 30 min. Both groups were treated once every other day, three times a week, totaling for 3 months. The Gesell developmental diagnostic scale (GESELL) was used to evaluate the developmental quotient (DQ) scores before and after treatment, and the blood samples of children with cerebral palsy before and after treatment and normal children were collected for amino acid metabolomics. **Results:** Compared before treatment, the DQ scores of adaptation, fine motor and social in the acupuncture and rehabilitation group was increased after treatment ($P < 0.05$), and the DQ score of fine motor in the rehabilitation group was increased after treatment ($P < 0.05$). Compared with the normal group, the serum L-glutamate, L-ornithine, L-tyrosine, L-methionine and L-arginine in the cerebral palsy group were down-regulated, and L-histidine, L-citrulline, 5-hydroxylysine and L-glutamine were up-regulated before treatment. The functional pathways mapped by different metabolites between the cerebral palsy group and the normal group included arginine biosynthesis, arginine and proline metabolism, etc. Compared with the cerebral palsy group, the serum L-histidine was decreased, and L-citrulline showed decreasing trend in the acupuncture and rehabilitation group after treatment. **Conclusion:** Acupuncture combined with rehabilitation training could improve cognitive function in children with cerebral palsy, and the effect may be related to the down-regulation of L-histidine and L-citrulline metabolism.

PMID: [34628741](#)

11. Evaluating Completeness of Discrete Data on Physical Functioning for Children with Cerebral Palsy in a Pediatric Rehabilitation Learning Health System

Nikolas J Koscielniak, Carole A Tucker, Andrew Grogan-Kaylor, Charles P Friedman, Rachel Richesson, Josh S Tucker, Gretchen A Piatt

Phys Ther. 2021 Oct 4;pzab234. doi: 10.1093/ptj/pzab234. Online ahead of print.

Objective: The purpose of this study was to determine the extent that physical function discrete data elements (DDE) documented in electronic health records (EHR) are complete within pediatric rehabilitation settings. **Methods:** A descriptive analysis on completeness of EHR-based DDEs detailing physical functioning for children with cerebral palsy (CP) was conducted. Data from an existing pediatric rehabilitation research learning health system (LHS) data network, consisting of EHR data from 20 care sites in a pediatric specialty healthcare system, were leveraged. Completeness was calculated for unique data elements, unique outpatient visits, and unique outpatient records. **Results:** Completeness of physical function DDEs was low across 5766 outpatient records (10.5%, ~2 DDEs documented). The DDE for Gross Motor Function Classification System (GMFCS) level was available for 21% ($n = 3746$) outpatient visits and 38% of patient records. Ambulation Level was the most frequently documented DDE. Intercept only mixed effects models demonstrated that 21.4% and 45% of the variance in completeness for DDEs and the GMFCS, respectively, across unique patient records could be attributed to factors at the individual care site level. **Conclusion:** Values of physical function DDEs are missing in designated fields of the EHR infrastructure for pediatric rehabilitation providers. While completeness appears limited for these DDEs, our observations indicate that data are not missing at random and may be influenced by system-level standards in clinical documentation practices between providers and factors specific to individual care sites. The extent of missing data has significant implications for pediatric rehabilitation quality measurement. More research is needed to understand why discrete data are missing in EHRs and to further elucidate the professional and system-level factors that influence completeness and missingness. **Impact:** Completeness of DDEs reported in this study is limited and presents a significant opportunity to improve documentation and standards to optimize EHR data for LHS research and quality measurement in pediatric rehabilitation settings.

PMID: [34636905](#)

12. Bridging Pediatric and Adult Rehabilitation Services for Young Adults With Childhood-Onset Disabilities: Evaluation of the LIFEspan Model of Transitional Care

Shauna Kingsnorth, Sally Lindsay, Joanne Maxwell, Yani Hamdani, Angela Colantonio, Jingqin Zhu, Mark Theodore Bayley, Colin Macarthur

Front Pediatr. 2021 Sep 17;9:728640. doi: 10.3389/fped.2021.728640. eCollection 2021.

Background: LIFEspan ("Living Independently and Fully Engaged") is a linked transition service model for youth and young adults with childhood-onset disabilities offered via an inter-agency partnership between two rehabilitation hospitals (one pediatric and one adult) in Toronto, Canada. **Objective:** The objective was to evaluate healthcare outcomes (continuity of care and healthcare utilization) for clients enrolled in LIFEspan. **Methods:** A prospective, longitudinal, observational mixed-method study design was used. The intervention group comprised youth with Acquired Brain Injury (ABI) and Cerebral Palsy (CP) enrolled in LIFEspan. A prospective comparison group comprised youth with Spina Bifida (SB) who received standard care. A retrospective comparison group comprised historical, disability-matched clients (with ABI and CP) discharged prior to model introduction. Medical charts were audited to determine continuity of care, i.e., whether study participants had at least one visit to an adult provider within 1 year post-discharge from the pediatric hospital. Secondary outcomes related to healthcare utilization were obtained from population-based, health service administrative datasets. Data were collected over a 3-year period: 2 years pre and 1 year post pediatric discharge. Rates were estimated per person-year. Fisher's Exact Test was used to examine differences between groups on the primary outcome, while repeated measures GEE Poisson regression was used to estimate rate ratios (post vs. pre) with 95% confidence intervals for the secondary outcomes. **Results:** Prospective enrolment comprised 30 ABI, 48 CP, and 21 SB participants. Retrospective enrolment comprised 15 ABI and 18 CP participants. LIFEspan participants demonstrated significantly greater continuity of care (45% had engagement with adult services in the year following discharge at 18 years), compared to the prospective SB group (14%). Healthcare utilization data were inconsistent with no significant changes in frequency of physician office visits, emergency department visits, or hospitalizations for clients enrolled in LIFEspan in the year following discharge, compared to the 2 years prior to discharge. **Conclusion:** Introduction of the LIFEspan model increased continuity of care, with successful transfer from pediatric to adult services for clients enrolled. Data on longer-term follow-up are recommended for greater understanding of the degree of adult engagement and influence of LIFEspan on healthcare utilization following transfer.

PMID: [34631624](https://pubmed.ncbi.nlm.nih.gov/34631624/)

13. Systematic Monitoring of Cognition for Adults With Cerebral Palsy-The Rationale Behind the Development of the CP Cog-Adult Follow-Up Protocol

Kristine Stadskleiv, Marleen R van Walsem, Guro L Andersen, Lena Bergqvist, Louise Bøttcher, Klaus Christensen, David Heyerdahl, Sandra Julsen Hollung, Helene Høye, Reidun Jahnsen, Gunvor L Klevberg, Barbro Lindquist, Henrik Passmark, Per-Ola Rike, Elisabet Rodby-Bousquet, Ann I Aliksson-Schmidt

Front Neurol. 2021 Sep 22;12:710440. doi: 10.3389/fneur.2021.710440. eCollection 2021.

Cerebral palsy (CP) comprises a heterogeneous group of conditions recognized by disturbances of movement and posture and is caused by a non-progressive injury to the developing brain. Birth prevalence of CP is about 2-2.5 per 1,000 live births. Although the motor impairment is the hallmark of the diagnosis, individuals with CP often have other impairments, including cognitive ones. Cognitive impairments may affect communication, education, vocational opportunities, participation, and mental health. For many years, CP has been considered a "childhood disability," but the challenges continue through the life course, and health issues may worsen and new challenges may arise with age. This is particularly true for cognitive impairments, which may become more pronounced as the demands of life increase. For individuals with CP, there is no one-to-one correlation between cognition and functioning in other areas, and therefore, cognition must be individually assessed to determine what targeted interventions might be beneficial. To facilitate this for children with CP, a systematic follow-up protocol of cognition, the CPCog, has been implemented in Norway and Sweden. However, no such protocol currently exists for adults with CP. Such discontinuity in healthcare services that results from lack of follow-up of cognitive functioning and subsequent needs for adjustments and interventions makes transition from pediatric to adult healthcare services challenging. As a result, a protocol for the surveillance of cognition in adults with CP, the CPCog-Adult, has been developed. It includes assessment of verbal skills, non-verbal reasoning, visual-spatial perception, and executive functioning. It is recommended to perform these assessments at least once in young adulthood and once in the mid-fifties. This report describes the process of developing the CPCog-Adult, which has a three-fold purpose: (1) to provide equal access to healthcare services to enable the detection of cognitive impairments; (2) to provide interventions that increase educational and vocational participation, enhance quality of life, and prevent secondary impairments; and (3) to collect systematic data for research purposes. The consent-based

registration of data in the well-established Swedish and Norwegian national CP registries will secure longitudinal data from childhood into adulthood.

PMID: [34630285](#)

14. Adults with cerebral palsy and Alzheimer disease: a missing link?

Sebastiaan Engelborghs

Dev Med Child Neurol. 2021 Oct 10. doi: 10.1111/dmcn.15080. Online ahead of print.

PMID: [34632577](#)