Cerebral palsy research news

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Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

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Interventions and Management

1.Postural control in children with spastic cerebral palsy: the role of brain lesion characteristics

Nina Jacobs, Simona Fiori, Andrea Guzzetta, Kaat Desloovere, Charlotte Johnson, Ann Hallemans, Els Ortibus, Pieter Meyns

Pediatr Res. 2026 Jan 13. Online ahead of print.

Background: Postural control is often impaired in children with spastic cerebral palsy (sCP), with inter-individual differences not fully explained by CP topography or functional level. While brain lesion characteristics are known determinants of upper limb function, their predictive value for postural control remains underexplored.
Methods: In this cross-sectional study, 43 children with uni- or bilateral sCP (GMFCS I–III), aged 5–12 years, underwent standardized postural control assessment using the Kids-BESTest-2 (in percent scores). Lesion type was classified using the MRI classification scale (MRICS), and lesion extent and location were retrospectively scored on clinical MRI using the semi-quantitative MRI (sqMRI) scale. Associations between lesion characteristics and postural control domains were analyzed using stepwise regression models.
Results: Children with predominant white or grey matter lesions performed similarly across all postural control domains. Greater lesion extent was significantly associated with poorer postural control in all domains ($\beta = -0.8$ to -1.8% per sqMRI point increase, $p \leq 0.02$) except Sensory Orientation. Lesions in the frontal lobe, anterior corpus callosum, PLIC, thalamus, and brainstem were the strongest predictors of domain-specific deficits, explaining up to 53% of variance.
Conclusion: Lesion extent and location, rather than type, determine the severity and domain-specificity of postural control deficits in sCP. Lesion-specific MRI scoring may support patient-tailored rehabilitation and prognosis.
PMID: 41530491

2.Risk factors for hip redislocation in surgically treated children with cerebral palsy: A multicenter study with follow-up until skeletal maturity

Rafik Ramazanov, Ulaş Can Kolaç, Evren Akpinar, Sadettin Ciftci, Guney Yilmaz, Mehmet Salih Soylemez, Murat Celal Sozbilen, Yavuz Saglam, Hakan Senaran, Abdullah Eren, Mehmet Ali Talmac, Ali Seker, Sema Ertan Birsel, Hanife Avci, Muharrem Yazici; COD NM Study Group

J Child Orthop . 2026 Jan 7:18632521251411141. Online ahead of print.

Purpose: To identify clinical and radiographic risk factors associated with hip redislocation in children with cerebral palsy (CP) who underwent surgical treatment for hip dislocation.
Methods: This multicenter retrospective study included children with CP who underwent reconstructive osteotomy for hip dislocation and were followed until triradiate cartilage closure. Demographic, clinical, and radiographic variables were evaluated. Univariate and multivariate logistic regression analyses were performed to identify independent risk factors for redislocation. Additionally, a classification and regression tree (CART) model was developed to stratify redislocation risk.
Results: Hip redislocation occurred in 25 of 115 hips (21.7%). Redislocation was significantly more frequent in hips treated with femoral osteotomy alone (40%) compared to combined femoral and pelvic osteotomies (16.7%), ($p = 0.026$). Multivariate analysis identified younger age at surgery (Odds ratio (OR) = 0.981, $p = 0.010$), higher postoperative Sharp's angle (OR = 1.082, $p = 0.034$), and lower postoperative Mose hip ratio (MHR) (OR = 0.007, $p = 0.033$) as independent predictors of redislocation. Radiographic ratios, including medial joint space to cranial joint space (MJS/CJS) and MJS to maximum capital femoral epiphysis diameter (MJS/MCFED), were also significantly higher in redislocated hips. The CART model classified patients into high- and low-risk groups based on surgical age ≤76 months, postoperative Sharp's angle ≥48°, and MHR < 0.69.
Conclusions: Younger surgical age, insufficient correction as indicated by a higher postoperative Sharp angle and lower MHR were independently associated with hip redislocation in CP patients undergoing surgery. MJS/CJS and MJS/MCFED ratios were also associated with redislocation, indicating incomplete reduction.
Significance of study: This study presents a clinically applicable decision-tree model to predict redislocation risk after CP hip reconstruction using radiographic parameters.
PMID: 41523788

3.Influence of body weight support on motor control in typically developing children and children with cerebral palsy

Allyson K Clarke, Andrew J Ries, Michael H Schwartz, Katherine M Steele

J Biomech . 2025 Dec 27:196:113139. Online ahead of print.

Abstract
Body weight support (BWS) is often provided during rehabilitation interventions or activities of daily living with assistive devices. For children with cerebral palsy (CP), interventions that provide support like BWS treadmill training, orthoses, or walkers have been shown to improve walking speed, endurance, and/or kinematics - although responses are variable and challenging to predict. How individuals alter their muscle activity and coordination in response to BWS provides insight into neuromuscular control and may inform the design of future interventions. The purpose of this study was to evaluate motor control while children with CP (n = 12) and typically developing (TD) peers (n = 8) walked on a treadmill with 1%, 20%, 40%, and 60% BWS. As BWS increased, activity of support muscles decreased for both CP and TD groups. Specifically, activity of the gluteus medius and gluteus maximus decreased by more than 35% for both groups at 60% BWS. The TD group also decreased soleus activity by 27% at 60% BWS, while the CP group decreased vastus lateralis activity by 26% at 60% BWS. Muscle synergy analysis was used to evaluate coordination. As expected, the children with CP had significantly reduced synergy complexity compared to TD peers (total variance accounted for by one synergy, tVAF1 = 76.3 for CP versus 67.4for TD averaged across all conditions). However, synergy complexity did not change with BWS for either group. These findings suggest that although BWS may assist mobility by reducing demand on support muscles, it does not directly modulate motor control.
PMID: 41518780

4.Calcaneo-Cuboid-Cuneiform Osteotomy for the Treatment of Planovalgus Feet in Patients with Spastic Cerebral Palsy

Bhushan S Sagade, Mandar V Agashe

JBJS Essent Surg Tech. 2026 Jan 14;16(1):e24.00032. doi: 10.2106/JBJS.ST.24.00032. eCollection 2026 Jan-Mar.

Background: The calcaneo-cuboid-cuneiform (triple-C) osteotomy is indicated for the correction of symptomatic flexible planovalgus foot deformity. This procedure allows correction of all of the varied components of the planovalgus foot deformity in a single operation1,2.
Description: The patient is positioned in a floppy lateral position2. The calcaneus is exposed via an oblique lateral incision along the peroneal tendons. The osteotomy is performed in an extra-articular fashion beginning posterior to the posterior articular facet and extending distally and anteriorly to the inferior surface of the calcaneus. The posterior calcaneal fragment is displaced medially to allow correction of heel valgus. A separate lateral incision is made over the cuboid in order to expose it. An osteotomy is performed in the middle third of the cuboid without violating the adjacent joints and opened with a lamina spreader to allow correction of the forefoot abduction. The medial cuneiform is exposed via a medial incision. A medial and plantar-based wedge of bone is removed in toto from the middle third of the cuneiform. Closing this wedge corrects forefoot supination and recreates the medial longitudinal arch. The wedge of bone harvested from the cuneiform is inserted into the cuboid and all of the osteotomies are fixed with Kirschner wires of sizes between 1.8 and 2.5 mm or cannulated cancellous screws.
Alternatives: If the feet are supple enough to allow passive correction, an in-socket ankle-foot orthosis with a medial arch support can be utilized to maintain the shape of the foot and to delay deterioration and the need for surgery3. Various other surgical treatment methods are described in the literature and can be categorized as joint-sparing procedures, arthroereises, and arthrodeses. Joint-preserving procedures include the popular calcaneal-lengthening osteotomy (CLO)4 and the double calcaneal osteotomy5. Arthroereisis, a non-fusion motion-limiting technique, is minimally invasive and recently gaining popularity3. The literature has described promising results with use of this procedure6. Extra-articular and intra-articular arthrodesis typically have been employed for the treatment of severe and rigid planovalgus feet and in children who have limited ambulatory potential. On the basis of the currently available literature, no procedure can be labeled superior to another3.
Rationale: The triple-C osteotomy is straightforward and has a short learning curve. There is no need for bone-graft harvesting and the associated morbidity thereof. Studies have shown minimal complications and low long-term recurrence with use of the triple-C osteotomy in patients with spastic cerebral palsy3.
Expected outcomes: We have reported on the short-term outcomes of this procedure2. The patient would be informed regarding the ability of the surgery to correct even severe deformities7. The procedure is not associated with notable complications, and the primarily reported complications are related to wound healing2,8. Although delayed healing of an osteotomy has been described by the originators of this technique1, we have not encountered this complication. We reported good clinical and radiographic outcomes in our series of 12 feet2. Moraleda et al.8 compared the outcomes of the triple-C osteotomy and CLO and reported similar outcomes in terms of clinical and radiographic correction, but with more frequent and more severe complications following CLO.
Important tips: Protect the sural nerve during calcaneal exposure. Osteotomize the medial cortex of the calcaneus with use of an osteotome in order to avoid injuring the medial neurovascular structures. Avoid violating the adjacent joints when performing the cuboid and cuneiform osteotomies. The wedge of bone harvested from the medial cuneiform should be excised in toto to effectively lengthen the cuboid.If utilized, cannulated cancellous screws should be countersunk in the posterior cortex of the calcaneus to prevent irritation.
Acronyms and abbreviations: AFO = ankle-foot orthosisUCBL = University of California Biomechanics LaboratoryCP = cerebral palsyAP = anteroposteriorVAS = visual analog scoreCC screws = cannulated cancellous screws.
PMID: 41522698

5.Utilizing multivariate pattern analysis to uncover the neurobiological underpinnings of communication disorders in children with bilateral spastic cerebral palsy: insights from morphological and structural connectivity changes

Jie Hu, Cheng He, Xianjun Li, Lisha Nie, Ying Peng, Haoxiang Jiang, Heng Liu, Tijiang Zhang

Quant Imaging Med Surg . 2026 Jan 1;16(1):75. Epub 2025 Dec 31.

Background: Bilateral spastic cerebral palsy (BSCP) is frequently associated with communication impairments, with magnetic resonance imaging (MRI) revealing morphological and connectivity changes. We develop an individual diagnostic model for communication impairment using multivariate lesion and connectome-based approaches in BSCP children.
Methods: A total of 28 children aged from 4 to 16 years diagnosed with BSCP and 31 matched typically developing children were recruited. All children received three-dimensional T1-weighted imaging (3D-T1WI) and diffusion tensor imaging (DTI) scans. Communication impairments were evaluated using the verbal comprehension index (VCI) and Communication Function Classification System (CFCS). The correlation between the MRI morphological and diffusion parameters and VCI and CFCS was analyzed, and support vector classification (SVC) algorithm was used to construct a diagnostic model of communication impairment in children with BSCP.
Results: Children with BSCP showed reduced mean cortical surface areas and gray matter volumes mainly in the frontal and temporal lobes, along with widespread decreases in white matter connectivity [false discovery rate (FDR) correction, $P<0.05$]. The morphological alterations and white matter fiber of bilateral frontal lobes, sensory motor areas, and part of temporal occipital lobes were associated with communication impairment of BSCP children ($P<0.05$). The combined SVC model, based on gray matter morphology and white matter fiber index, can be utilized for diagnosing communication impairments in children with BSCP, achieving an accuracy of 80.77% and an area under the curve of 0.88. The cortex features that distinguished communication impairment in children with BSCP were predominantly found in the bilateral middle frontal gyrus, left middle temporal gyrus, and the white matter fiber features were primarily located within and between the bilateral frontal lobes, sensorimotor areas, and partial temporo-occipital lobes.
Conclusions: The brain morphological and white matter connectivity changes are associated with communication impairment in BSCP children. The multi-parametric MRI can be used to establish an individualized diagnosis model of communication impairment in children with BSCP.
PMID: 41521984

6.Sport performance in virtual worlds: a systematic review of sport simulation in neurological paralympic athletes and non-athlete populations

Rocco Salvatore Calabrò, Andrea Calderone, Maria Grazia Maggio, Francesco Speciale, Daniele Bruschetta, Maurizio Lanza, Angelo Quartarone

BMC Sports Sci Med Rehabil . 2026 Jan 10. Online ahead of print.

No abstract available
PMID: 41519819

7.Transforming care across oceans

Gaela Kilgour, Leanne Sakzweski

Dev Med Child Neurol. 2026 Jan 16. Online ahead of print.

Abstract
No abstract available.
PMID: 41545315

8.A multivariable model for improving the identification of cerebral palsy cases in administrative health data

Peter M Socha, Maryam Oskoui, Jennifer A Hutcheon, Sam Harper

Ann Epidemiol. 2026 Jan 13;114:26–31. Online ahead of print.

Purpose: To improve the identification of cerebral palsy cases in administrative health data.
Methods: We included all children in a population-based cerebral palsy registry in Quebec, Canada, born from 1999 through 2002, and a sample of children without cerebral palsy. Population-based hospitalization and physician billing records through 2012 were obtained for all children. We used logistic regression to model the probability of cerebral palsy, using International Classification of Diseases codes for related diseases. We reported receiver operating characteristic (ROC) and precision-recall (PR) curves, and compared the accuracy to that of existing algorithms. We also reported the accuracy of cerebral palsy codes by age, data source, and gestational age at birth.
Results: The area under the ROC and PR curves of our model were 0.98 (95% CI: 0.97–0.99) and 0.73 (95% CI: 0.63–0.79), respectively. Cut-offs with a similar specificity to existing algorithms yielded sensitivities that were 1–14 percentage points higher. The sensitivity of cerebral palsy codes was higher (and the specificity was lower) with longer follow-up times since birth, when using both hospitalization and billing records, and among children born preterm.
Conclusions: Our model improved identification of cerebral palsy cases in administrative data, but residual misclassification remained.
PMID: 41539408

9.High ambient temperature during pregnancy and offspring cerebral palsy: A population-based case-control study in California

Haoran Zhuo, Joshua L Warren, Giselle Bellia, Pin Wang, Kai Chen, Zeyan Liew, Tormod Rogne

Environ Res. 2026 Jan 12;293:123757. Online ahead of print.

Background: Cerebral palsy (CP) is the most common neuromotor disorder in childhood and environmental factors may play important etiological roles. We aimed to investigate whether prenatal exposure to high ambient temperature was associated with CP risk in the offspring.
Methods: We conducted a nested case-control study in California that included CP cases from a statewide system on developmental disabilities and randomly selected 20% births without CP as controls during 2005–2015. Gestational weekly-average temperatures were calculated from high-resolution (1 km) daily mean temperatures at the maternal residential address at birth. We implemented a distributed lag model within a logistic framework to estimate the associations between per 5 °C increase of temperature, extreme heat that above the 90th percentile of the local temperature distribution, and CP risk in gestational week 0–31 and final seven weeks preceding birth. Further, we performed a sibling analysis to consider the influence of uncontrolled confounding.
Results: The study population included 5938 CP cases and 1,092,313 controls. There was an increased risk of CP associated with per 5 °C increase of weekly ambient temperature (odds ratio, ORs: 2%, 95% credible interval: 1%–5%) or extreme heat (ORs of 4–5%, 95% credible interval: 0%–13%) in the early pregnancy. Stronger associations were observed if such exposures happened cumulatively over time (ORs of 8%–18%). A similar trend was also suggested in the sibling analyses.
Conclusions: Early-pregnancy exposure to high ambient temperature was associated with increased risk of childhood CP. Our findings urge further monitoring of childhood neurodevelopmental disorders in the context of changing climate.
PMID: 41534582

10.Long-term disability after neonatal encephalopathy in low-resource settings

Shona Goldsmith, Eleanor R Gunn, Alistair J Gunn, Nadia Badawi

Pediatr Res. 2026 Jan 13. Online ahead of print.

Abstract
No abstract available.
PMID: 41530489

11.How adults with cerebral palsy successfully confront and cope with ableism: a peer-led research project

Cadeyrn J Gaskin, Andrew D Brown, Sue Harris, Alex Birnie, Carmen Vargas, Finn O'Keefe, Angela Dew, Debbie Dorfan, Freya Munzel, Claudia Strugnell, Maddie Fogarty, Adam Goodridge, Joy Martin Mitchell, Shelley Spencer

Int J Qual Stud Health Well-being. 2026 Dec 31;21(1):2616117. Epub 2026 Jan 15.

Purpose: This study focused on how adults with cerebral palsy successfully confronted ableism during encounters with others and successfully coped with ableism in general.
Methods: Adults with cerebral palsy led this critical participatory action research project, in which ten adults with cerebral palsy shared their experiences (via an online survey or interview) of successfully confronting ableism (situations, actions taken, and outcomes) and coping with ableism.
Results: Participants had difficulty recalling successful confrontations due to failing to recognise ableism, ignoring it, or being unsure whether confrontations were successful. Of the 23 situations described, common forms of ableism were denial of privacy, perceived helplessness, and spread effect. Actions taken in successful confrontations were educating perpetrators, being independent, self-advocating or requesting advocacy, attempting to make perpetrators feel uncomfortable, and disengaging with perpetrators (and encouraging others to do similar). Outcomes were changed perpetrator behaviour, apparent changed perpetrator perceptions, actions to prevent recurrence of ableism, disengagement, changed thinking, and feeling successful. Adults coped with ableism through changing their own thinking about disability and ableism, engaging in everyday activities, seeking social support, and making efforts to change society.
Conclusions: Harnessing this knowledge may assist people with cerebral palsy to challenge the social oppression they face.
PMID: 41543245

12.Childhood motor speech disorders: who to prioritise for genetic testing

Halianna Van Niel, Mariana Lauretta, Emma Baker, Lorraine O'Donnell, Charlotte Boulton, Celia Brenchley, David Coman, Evyenia Michellis, Himanshu Goel, Geoff Thompson, Richard Webster, Georgia Paxton, Zornitza Stark, Ingrid E Scheffer, Michael S Hildebrand, David J Amor, Angela T Morgan

Eur J Hum Genet. 2026 Jan 13. Online ahead of print.

Abstract
The aetiology of childhood motor speech disorders of dysarthria and apraxia has been poorly understood. Recent evidence suggests a moderate genetic contribution for these rare and severe speech disorders. To date, however, no studies have examined genetic diagnostic yield for childhood apraxia of speech (CAS) and dysarthria in a clinical setting. Here, we used a clinically accredited genomics pipeline to investigate genetic diagnostic yield and variables predictive of a genetic diagnosis in a tertiary hospital speech clinic. A cohort of 153 children (range 2;7–16;5 years, 42 female) ascertained for motor speech disorder were assessed by a clinical geneticist and speech pathologist and underwent chromosomal microarray, Fragile X and exome sequencing. Odds ratios identified predictors of genetic diagnosis. Forty-four of 153 (29%, 15 female) had pathogenic variants (30 de novo), encompassing monogenic conditions (n = 35) and copy number variants (n = 9) across 38 distinct disorders. Delayed walking, fine and gross motor disorder, receptive language impairment and/or cognitive impairment, and dysmorphism were associated with a genetic diagnosis. The presence of CAS and dysarthria was more commonly associated with a genetic diagnosis than CAS alone. Autism spectrum disorder was less commonly associated with a genetic diagnosis. No child had a Fragile X diagnosis. The clinical genetic diagnostic yield for motor speech disorders is comparable to epilepsy and cerebral palsy, conditions where genetic testing is routine in most centres, unlike for motor speech disorders. Children with motor speech disorder with co-occurring motor, language and/or learning deficits should be prioritised for genomic testing.
PMID: 41530369

13."We don't know what to do with an adult" A Qualitative Study of Cerebral Palsy Transition Gaps

Cristina A Sarmiento, Chloe Glaros, Christine Petranovich, Hannah Friedman, James Feinstein, Edward Hurvitz, Megan A Morris, Lisa A Brenner, Brooke Dorsey

Arch Phys Med Rehabil. 2026 Jan 11. Online ahead of print.

Objective: To increase our understanding of the transition experiences and care gaps of young adults with cerebral palsy (CP) who recently transitioned to adult-based care.
Design: Qualitative descriptive study using semi-structured interviews.
Setting: Adult-based CP specialty clinic.
Participants: Eligible adults with CP were between the ages of 18–40 years, English-speaking, and seen in the adult CP clinic at least once. Caregivers were eligible if they were the primary support person for an adult with CP who met study criteria and were English-speaking. Participants were purposefully sampled to promote diversity of demographic background and level of functional mobility.
Interventions: Not applicable.
Main outcome measures: Themes associated with participants' transition and care gap experiences.
Results: Of the 21 interviews completed, there were 7 adult with CP interviews, 9 caregiver interviews (1 with 2 caregivers), and 5 dyadic interviews (27 participants total). Adults with CP who participated or were represented by their caregiver(s) ranged between 20–37 years old with relatively equal male and female, as well as functional level, representation. Six participants identified as non-White (29%), five as Hispanic (24%), and two were from rural communities (10%). Four major themes were identified: 1) the value of transition preparation and discussion; 2) the need for supportive, coordinated care; 3) struggling through gaps in care during the transition; and 4) the importance of and challenges to ensuring lifespan care.
Conclusions: Young adults with CP face complex challenges in the transition to adulthood, including inadequate preparation and a lack of adult-based services to meet their needs. Adults with CP who have successfully established adult-based CP care and their caregivers value support in transferring to adult care and access to CP-specific care throughout the lifespan.
PMID: 41529759

14.Caregivers' Perspectives on the Health Status of Children With Cerebral Palsy

Sahar Mohamed Ahmed Hassanein, Ghada Essam Eldin Amin, Nermin Hassan El-Gharbawy, Duaa Mohamed Mostafa Mohamed, Asmaa Wafeeq Abdelaziz

J Appl Res Intellect Disabil. 2026 Jan;39(1):e70180.

Background: Identifying the needs of children with cerebral palsy and their caregivers is still a current clinical practice gap. This study aimed to assess parents' perceptions of their children with cerebral palsy using the Arabic version of the Caregiver Priorities and Child Health Index of Life with Disabilities (CPCHILD) scale and identify factors influencing these perceptions.
Methods: Seventy children with cerebral palsy and their caregivers were recruited in this hospital-based cross-sectional study. The Arabic version of the CPCHILD scale was used to assess parents' perceptions of their cerebral palsy children's priorities. Participants' clinical and demographic traits were assessed to identify potential risk factors.
Results: Poor CPCHILD scores were predicted by older mothers, children with co-occurring intellectual disability, children with severe disabilities and children who did not receive frequent physiotherapy.
Conclusion: Identifying the risk factors can help optimise medical care and support services for children with cerebral palsy and their families.
PMID: 41525770

Prevention and Cure

15.Implementation of physiological interpretation of fetal heart rate changes: from scientific principles to frontline practice

Edwin Chandraharan, Ilenia Mappa, Anna Gracia Perez-Bonfils, Susana Pereira

J Matern Fetal Neonatal Med. 2026 Dec;39(1):2612451. Epub 2026 Jan 14.

Abstract
Onset of uterine contractions which become progressively more frequent, intense and last for longer durations as labor progresses is expected to cause a gradually evolving hypoxic stress to human fetuses. This is because of the repeated constriction of maternal spiral arterioles supplying the placental bed and compression of the umbilical cord as the labor advances. The majority of fetuses are able to mount physiological compensatory responses to protect their high priority central organs by maintaining aerobic metabolism. However, fetuses who are exposed to preexisting compromise such as chronic utero -placental insufficiency, chorioamnionitis or chronic fetal anemia and acidosis may not have sufficient reserves to withstand further hypoxic stress, leading to rapid decompensation and neurological injury or death. Physiological interpretation of fetal heart rate changes involves recognition of specific features of both hypoxic and non-hypoxic stresses on the cardiotocograph (CTG) and determining the fetal compensatory responses to ongoing stress. This approach which is based on the cardinal principle of individualization of care will enable frontline clinicians to differentiate features of compensation from decompensation. Timely interventions to improve intrauterine environment and/or to accomplish urgent birth will help avoid hypoxic ischemic encephalopathy (HIE) and its long term sequelae (cerebral palsy or learning difficulties) and perinatal deaths. Conversely, continuation of labor with careful observation in fetuses with compensated gradually evolving hypoxic stress will help avoid unnecessary intrapartum operative interventions. Emerging evidence suggests reduction in the rates of both HIE and emergency cesarean sections following the implementation of principles of physiological interpretation of CTG.
PMID: 41535023

16.Towards Biomarker Discovery for Early Cerebral Palsy Detection: Evaluating Explanations Through Kinematic Perturbations

Kimji N Pellano, Inga Strumke, Daniel Groos, Lars Adde, Pal Haugen, Espen Alexander F Ihlen

IEEE Trans Neural Syst Rehabil Eng. 2026 Jan 14:PP. Online ahead of print.

Abstract
Cerebral palsy (CP) is a prevalent motor disability in children, for which early detection can significantly improve treatment outcomes. While skeleton-based Graph Convolutional Network (GCN) models have shown promise in automatically predicting CP risk from infant videos, their “black-box” nature raises concerns about clinical explainability. To address this, we introduce a perturbation framework tailored for infant movement features and use it to compare two explainable AI (XAI) methods: Class Activation Mapping (CAM) and Gradient-weighted Class Activation Mapping (Grad-CAM). First, we identify significant and non-significant body keypoints in very low and very high risk infant video snippets based on the XAI attribution scores. We then conduct targeted velocity and angular perturbations, both individually and in combination, on these keypoints to assess how the GCN model’s risk predictions change. Our results indicate that velocity-driven features of the arms, hips, and legs appear to have a dominant influence on CP risk predictions, while angular perturbations have a more modest impact. Furthermore, CAM and Grad-CAM show partial convergence in their explanations for both low and high CP risk groups. Our findings demonstrate the use of XAI-driven movement analysis for early CP prediction, and offer insights into potential movement-based biomarker discovery that warrant further clinical validation.
PMID: 41533622