Clinical profiles of ambulatory and non-ambulatory school-aged children and young people with cerebral palsy in Aotearoa New Zealand: implications for the health education interface

Karen Adams, Julia Hill, Alexandra Sorhage, Anja Vorster, Julie Blamires

ABSTRACT

AIM: In Aotearoa New Zealand, ambulatory ability impacts Ministry of Education – Te Tāhuhu o te Mātauranga therapy funding for school-aged children with cerebral palsy, yet demographic and clinical profiles across mobility groups remain poorly described. This study utilises data from the New Zealand Cerebral Palsy Register/Te Rēhita a Hōkai Nukurangi Aotearoa to compare ambulatory and non-ambulatory school-aged children, highlighting their distinct clinical needs.

METHOD: A correlational, observational analysis of 1,149 participants aged 5–21 years was conducted. Data were categorised into Gross Motor Function Classification System (GMFCS) I–III, and GMFCS IV and V, with significant associations identified using Chi-squared tests and univariate logistic regression.

RESULTS: Three hundred and forty-one (29.7%) children were classified as GMFCS IV and V. Compared to GMFCS I–III, those classified as GMFCS IV and V were more likely to have epilepsy (odds ratio [OR]=7.2 [5.2–10.0]), bilateral deafness (OR=5.4 [2.6–11.4]), moderate or severe intellectual impairment (OR=21.9 [13.3–35.9]) and be non-verbal (OR=89.1 [48.3–164.5]) or functionally blind (OR=63.4 [30.3–133.0]) (all 95% confidence interval [95% CI]). GMFCS levels corresponded with higher Manual Ability Classification System, Communication Function Classification System and Eating and Drinking Ability Classification System levels.

CONCLUSION: Non-ambulatory children with cerebral palsy have more complex, co-occurring impairments that extend beyond physical limitations and require support outside of school-based service provision. The findings underscore the need for whole-of-life, transdisciplinary approaches to both funding and management in Aotearoa New Zealand.

Cerebral palsy hōkai nukurangi (CP) is the leading cause of physical disability in childhood in developed countries.[1] Each child presents with unique motor and postural impairments, often alongside comorbidities such as speech and language disorders, epilepsy and intellectual disability,[2] reflecting the broader functional consequences of the underlying brain dysplasia or injury. There is a cascade of impairments in CP that may affect quality of life due to the interaction of comorbidities. [2] For example, poor oral motor function can lead to feeding challenges, aspiration and a subsequent risk of respiratory complications. Understanding these co-occurring complications, and their associated risks, is vital for all clinicians who have a primary role in CP healthcare provision.

Heterogeneity has led to the widespread use of classification systems to describe the abilities of those living with CP. The Gross Motor Function Classification System (GMFCS)[3] classifies gross motor functional abilities and limitations, distinguishing between GMFCS levels I–III, who have capacity for independent ambulation (including with walking aids), and GMFCS IV and V, who are non-ambulatory without physical assistance. Following prior research that stratifies children and young people (CYP) into ambulatory and non-ambulatory groups when investigating co-occurring impairments,[4,5] this study adopts the same classification: GMFCS I–III as ambulatory and GMFCS IV and V as non-ambulatory. This mobility difference has been shown to be associated with postural deformities and contractures,[6] affecting many domains of the International Classification of Functioning, Disability and Health.[7,8] Understanding differential impairment profiles of ambulatory versus non-ambulatory CYP is therefore clinically important as it impacts the suitability of interventions and facilitates a holistic approach to care.

This importance is reflected in the ongoing interest of international CP registers in identifying participant impairment profiles[4–6] with a recent focus on higher GMFCS levels.[7] However, to date, this has not been undertaken in Aotearoa New Zealand.

The New Zealand Cerebral Palsy Register/ Te Rēhita a Hōkai Nukurangi Aotearoa (NZCPR) reports that approximately 30% of children living with CP in New Zealand are non-ambulatory.[9] Understanding New Zealand impairment profiles is important given the context of therapy provision in New Zealand, particularly relevant to physiotherapists who are primary clinicians involved in CP care. School-aged CYP with CP have physiotherapy needs funded by the Ministry of Education – Te Tāhuhu o te Mātauranga, either through Physical Disability Support (PDS)[10] or the Ongoing Resourcing Scheme (ORS).[11] They may also be entitled to Accident Compensation Corporation (ACC) funding if their disability is due to accidental injury. PDS services only fund CYP whose physical disability affects participation in learning[10] rather than being a whole-of-life approach and often applies to more ambulatory CYP.

For those CYP with high or very high physical needs, ORS funding is provided (Appendix Table 1). This allows for the provision of additional and specialist resources, again aimed at supporting schooling [11] rather than whole-of-life care. For all PDS- and ORS-funded CYP, non-school-related needs are supported by Child Development Services (CDS) through the Ministry of Health – Manatū Hauora. The negative impacts of narrowing therapy provision from a whole-of-life approach to a predominantly education-focussed model have recently been highlighted,[12] with concerns this may contribute to fragmented care. ORS funding is also available if CYP meet the criteria of having high or very high learning, hearing, vision or communication needs, or a combination of moderate needs (Appendix Table 1). Needs identified in ORS applications impact access to specialist orientation and mobility instructors, specialist learning, vision or hearing teachers and advisors on deaf children. As of 2025, 665 CYP qualified for physical needs–based ORS funding.[13] However, only 485 students received ORS funding under two criteria, and six under three criteria. As overseas evidence suggests that children with non-ambulatory CP have an increased number and severity of comorbidities,[2,4] CYP with severe physical needs in New Zealand may not be having all impairments acknowledged in ORS applications, affecting access to developmental resources. Therefore, understanding the impairment profile of non-ambulatory CYP with CP in New Zealand has funding and resource allocation implications.

This study aimed to: 1) describe the school-aged NZCPR population classified as GMFCS IV and V and their associated impairments using demographic and clinical data, and 2) compare GMFCS I–III and IV and V populations to explore differential clinical needs. These aims were examined through a physiotherapy clinical decision-making lens and conducted alongside a larger study investigating physiotherapy interventions for school-aged non-ambulatory children with CP and intellectual disability in New Zealand.

Method

Design

This was a correlational, observational, registry-based study exploring relationships between variables using secondary data. Ethical approval was granted by the Auckland University of Technology Ethics Committee (23/271).

NZCPR

The NZCPR was established in 2015 and has Health and Disability Ethics Committee approval (13/NTA/130) to collect health information for all people with lived experience of CP in New Zealand. Clinical details are verified at age 5, with an opt-out option at age 16. The NZCPR has approximately 60% national ascertainment for people under 21 years old. Analysis of NZCPR data for the purposes of this study was approved by the Health New Zealand – Te Whatu Ora Auckland Research Office.

Participants

Participants were eligible for inclusion if they had a diagnosis of CP and were aged 5–20.99 years at the date of data extraction. Data were extracted on 30 July 2025. CYP aged up to 20.99 years were included to reflect eligibility for PDS or ORS funding.

Classification systems

In addition to the GMFCS, the Manual Ability Classification System (MACS) classifies children's manual ability during everyday tasks.[14] The Communication Function Classification System (CFCS) classifies communication performance, considering all communication methods.[15] The Eating and Drinking Ability Classification System (EDACS) describes functional eating and drinking ability,

including key features of safety and efficiency.[16] (Full clinical features in Appendix Table 2.) The stability of the GMFCS, MACS and CFCS is established from age 4 years[17] with these scales demonstrating good construct validity and reliability.[18] Reliability and validity of the EDACS has also been demonstrated.[16] CP type descriptors used are in line with those on the Australian Cerebral Palsy Register, reported as hemiplegia, diplegia, quadriplegia or movement disorders/hypotonia. Ethnicity was coded according to the Stats NZ Tatauranga Aotearoa Level 1 ethnicity groups as recommended by the NZCPR. Impairment, mortality and ACC status were classified according to clinical examination by the reporting physician (Appendix Table 3). Impairment classification reflects the Australian Cerebral Palsy Register to allow for regional comparability. Mortality status was recorded at the time of data extraction. As age of death was not available, it is possible that a small number of deceased CYP had not yet reached the age of formal CP diagnostic confirmation at age 5. These individuals have been retained in mortality reporting as they were registered with the NZCPR with a clinical profile consistent with CP, and as of the date of data extraction would have met the inclusion criteria.

Data and statistical analysis

Analyses were performed using Microsoft Excel and IBM SPSS Statistics (version 29). Data were grouped into two categories upon extraction: GMFCS I–III and GMFCS IV or V. Records with blank, unknown or unrecorded GMFCS levels were classified as missing data. Categorical data were summarised using frequencies (n) and percentages (%), with age (continuous data) reported as mean, median, mode, standard deviation (SD) and skewness.

Chi-squared tests ($p<0.05$) were used to examine differences between the two GMFCS groups for each impairment variable, with Bonferroni-adjusted z-tests applied for *post hoc* comparisons where relevant. Univariate logistic regression models were tested to estimate associations between GMFCS group (independent variable with GMFCS I–III as reference) and each impairment (i.e., vision, hearing, speech, intellectual and epilepsy) as dependent variables (with no impairment as reference). Intellectual impairment categories were collapsed into no impairment (from no impairment and probably no impairment), probably some or mild impairment, and moderate or severe impairment. The dependent variables were multinomial with three categories, except for epilepsy, which was binary. Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs) and p-values.

A Student's *t*-Test explored whether the mean number of impairments differed significantly between groups, reported as mean, SD and p-values. Associations between each variable were summarised, as frequencies (n) and percentages (%).

Results

Participants

One thousand one hundred and forty-nine participants were identified of whom 808 (70.3%) were classified as GMFCS I–III. Characteristics of all participants are presented in Table 1.

Ethnicity differed significantly between groups ($p<0.05$), with more New Zealand Māori CYP in GMFCS IV or V and more European CYP in GMFCS I–III. Mortality was higher in GMFCS IV and V (5.1%) than GMFCS I–III (1.9%). GMFCS IV or V CYP were significantly more likely to receive ACC funding (23.8% versus 10.1%, $p<0.05$); however, 30% of records lacked funding data. GMFCS IV or V CYP were also more likely to have movement disorders or spastic quadriplegia ($p<0.05$). Mean age was similar between groups: 13.3 years (SD 4.2) for GMFCS I–III and 13.7 years (SD 4.2) for GMFCS IV and V (Appendix Table 4).

Classification scales

Across all classification systems, higher GMFCS levels corresponded with higher CFCS, MACS and EDACS levels (Appendix Figure 1), indicating greater communication and manual ability concerns, along with concerns related to eating and drinking with increasing motor impairment.

Associated impairments

Associated impairment data show that, in New Zealand, GMFCS IV or V CYP have a greater number and severity of impairments compared to GMFCS I–III (Figure 1). GMFCS IV or V CYP are more likely to have epilepsy (63.5% versus 22.6%), be non-verbal (71.7% versus 6.4%), be functionally blind (35.5% versus 1.5%) and have a hearing impairment (25.8% versus 11%) (Table 2). Only 11.0% of GMFCS IV and V had no intellectual impairment, compared to 56.3% of GMFCS I–III.

Most individuals in GMFCS levels I–III had few associated impairments, typically one or two (Table 3). In contrast, GMFCS IV and V individuals

Table 1: Descriptive characteristics of the 1,149 children with cerebral palsy within Gross Motor Function Classification System (GMFCS) levels I–III (ambulatory) and GMFCS IV and V (non-ambulatory) groups.

	GMFCS I–III		GMFCS IV and V		Total	
	n	%	n	%	n	%
Total	808	70.3%	341	29.7%	1,149	
Gender	806		340		1,146	
Female	334	41.4%	142	41.8%	476	41.5%
Male	472	58.6%	198	58.2%	670	58.5%
Ethnicity	808		341		1,149	
European (NZ and other European)	436*	54.0%	136*	39.9%	572	49.8%
New Zealand Māori	177*	21.9%	98*	28.7%	275	23.9%
Pacific people (Cook Island, Samoan, Tongan, Niuean, etc.)	63	7.8%	33	9.7%	96	8.4%
Asian (Chinese, Indian and other Asian)	72	8.9%	37	10.9%	109	9.5%
Other ethnicity	60	7.4%	37	10.9%	97	8.4%
CP type	722		305		1,027	
Spastic hemiplegia	383*	53.0%	9*	3.0%	392	38.2%
Spastic diplegia	251*	34.8%	23*	7.5%	274	26.7%
Spastic quadriplegia	47*	6.5%	239*	78.4%	286	27.8%
Movement disorders	41*	5.7%	34*	11.1%	75	7.3%
Mortality	794		336		1,130	
Still alive	779*	98.1%	319*	94.9%	1,098	97.2%
Deceased	15*	1.9%	17*	5.1%	32	2.8%
ACC status	534		265		799	
Yes	54*	10.1%	63*	23.8%	117	14.6%
No	477	89.3%	197	74.3%	674	84.4%
Pending	3*	0.6%	5*	1.9%	8	1.0%

*GMFCS group categories whose column proportions differ significantly from each other at the 0.05 level. ACC = Accident Compensation Corporation; CP = cerebral palsy.

more commonly had three or more impairments. Mean impairment counts were higher in GMFCS IV and V (2.44 versus 1.15, p<0.001).

Compared with GMFCS I–III, children in GMFCS IV and V were significantly more likely to have epilepsy, speech impairment, be non-verbal, have visual impairment or blindness, and hearing impairment or deafness (all p<0.001; Table 4).

In GMFCS I–III CYP, the strongest pairwise impairment associations involved absence of hearing impairment, which co-occurred with no epilepsy (45%), no visual impairment (42%), no speech impairment (39%) and no intellectual impairment (34%) (Appendix Table 5). In GMFCS IV and V CYP, the strongest associations were between epilepsy and being non-verbal (29%), epilepsy and intellectual impairment (35%) and being non-verbal and intellectual impairment (37%) (Appendix Table 6).

Table 2: Impairment data within Gross Motor Function Classification System (GMFCS) levels I–III (ambulatory) and GMFCS IV and V (non-ambulatory) groups.

	GMFCS I–III		GMFCS IV and V		Total	
	n	%	n	%	n	%
Epilepsy	614		277		891	
Yes	139*	22.6%	176*	63.5%	315	35.4%
No	436*	71.0%	77*	27.8%	513	57.6%
Resolved by age 5	39	6.4%	24	8.7%	63	7.1%
Speech	532		212		744	
No impairment	339*	63.7%	17*	8.0%	356	47.8%
Some impairment	159*	29.9%	43*	20.3%	202	27.2%
Non-verbal	34*	6.4%	152*	71.7%	186	25.0%
Vision	589		242		831	
No impairment	385*	65.4%	58*	24.0%	443	53.5%
Some impairment (wears glasses)	195	33.1%	98	40.5%	293	35.3%
Functionally blind	9*	1.5%	86*	35.5%	95	11.4%
Hearing	593		209		802	
No impairment	528*	89.0%	155*	74.2%	683	85.2%
Some impairment (includes conductive hearing loss)	53*	8.9%	35*	16.7%	88	11.0%
Bilateral deafness	12*	2.0%	19*	9.1%	31	3.9%
Intellect	544		219		763	
No impairment	306*	56.3%	24*	11.0%	330	43.3%
Probably some impairment	66*	12.1%	43*	19.6%	109	14.3%
Mild	88*	16.2%	8*	3.7%	96	12.6%
Moderate	74*	13.6%	72*	32.9%	146	19.1%
Severe	10*	1.8%	72*	32.9%	82	7.1%

*GMFCS group categories whose column proportions differ significantly from each other at the 0.05 level.

Table 3: Number of impairments for Gross Motor Function Classification System (GMFCS) levels I–III (ambulatory) and GMFCS IV and V (non-ambulatory) groups.

	0	1	2	3	4	5	Mean	SD	Student's *t*-Test
GMFCS I–III (n=808)	327	207	141	98	32	3	1.15	1.21	<0.001
GMFCS IV and V (n=341)	45	54	55	94	78	15	2.44	1.44	

SD = standard deviation.

Figure 1: Relative proportion of impairment severity within Gross Motor Function Classification System (GMFCS) ambulatory groupings—a) epilepsy, b) speech, c) vision, d) hearing, e) intellect.

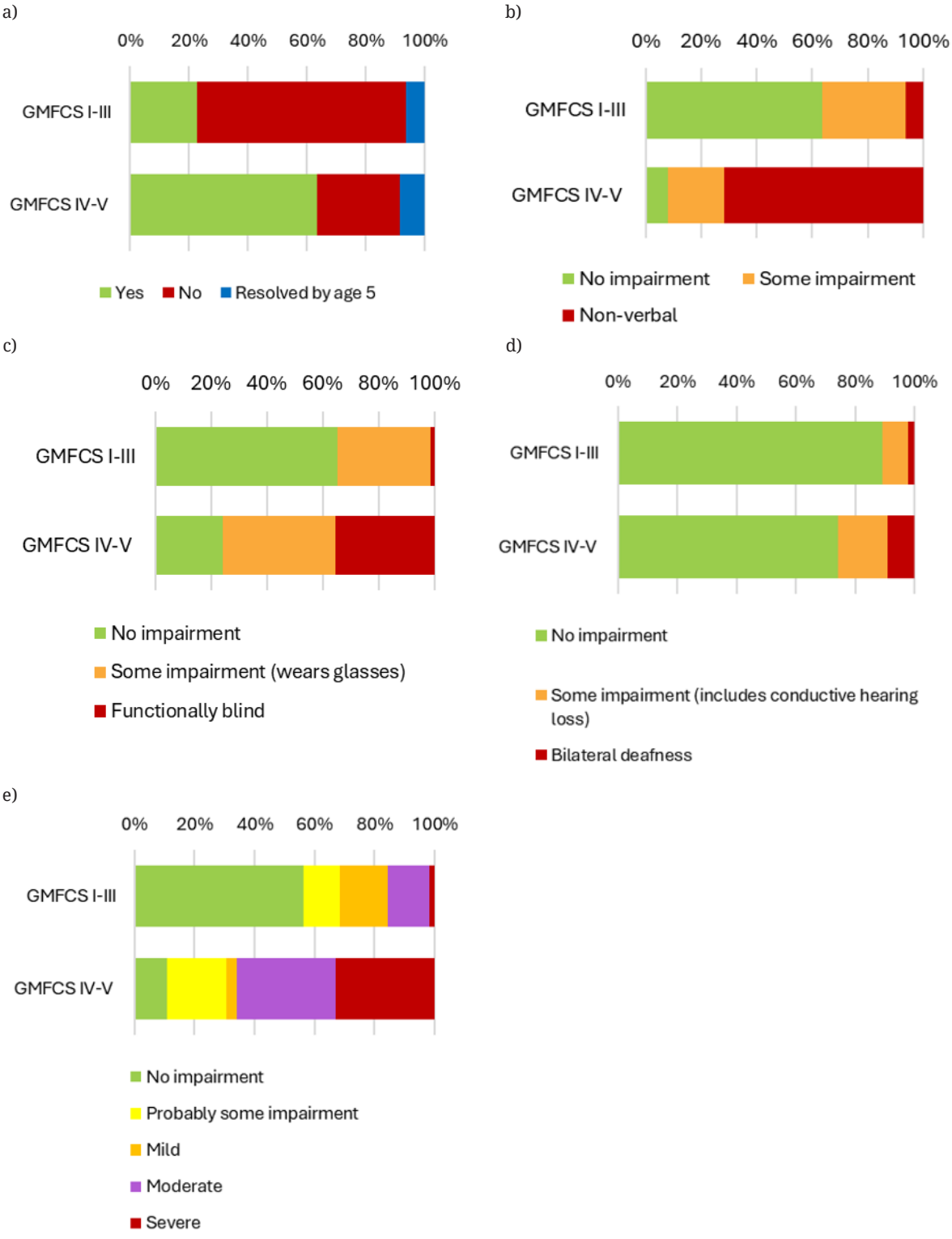


Table 4: Univariate regression analysis for the relationships between Gross Motor Function Classification System (GMFCS) groups and impairments (as outcomes) with odds ratios (ORs) and 95% confidence intervals (CIs).

	GMFCS IV and V children			
	OR	**95% CI**		**p-value**
Epilepsy	7.17	5.16	9.96	<.001
Speech				
Some speech impairment	5.39	2.98	9.75	<.001
Non-verbal	89.15	48.30	164.54	<.001
Vision				
Some vision impairment	3.34	2.31	4.82	<.001
Functionally blind	63.43	30.26	132.95	<.001
Hearing				
Some hearing impairment	2.25	1.42	3.57	<.001
Bilateral deafness	5.39	2.56	11.36	<.001
Intellect				
Some or mild intellectual impairment	4.22	2.50	7.12	<.001
Moderate or severe intellectual impairment	21.86	13.32	35.86	<.001

Reference category for the predictor is GMFCS I–III and for the outcome is no impairment.

Discussion

This study represents the first analysis using NZCPR data examining impairment profiles in ambulatory and non-ambulatory CYP with CP. The findings reveal that non-ambulatory CYP with CP have a greater number and severity of impairments compared to those who are ambulatory.

Our analysis indicates that non-ambulatory CYP are at an increased risk of mortality. Although cause of death is not identified in our data, respiratory disorders are a known cause of death for CYP with CP,[19] and higher EDACS scores are associated with higher risk of respiratory disease.[20] Our non-ambulatory group demonstrated higher EDACS scores, emphasising the importance of regular respiratory monitoring in this sub-group.

Non-ambulatory CYP with CP in New Zealand most frequently present with spastic quadriplegia, consistent with international literature[4,5] and reflecting increased motor impairment at higher GMFCS levels. A higher percentage of non-ambulatory CYP have ACC funding in New Zealand. However, ACC status was missing for nearly one-third of the sample. Without accurate recording of funding status across all streams, the ability to plan the therapy workforce, allocate resources and deliver services that meet the needs of CYP with CP is compromised.

Our results show that non-ambulatory CYP carry a greater impairment burden that encompasses, but extends beyond, motor function. The GMFCS IV and V group had a higher prevalence of comorbidities such as epilepsy, speech, vision, hearing and intellectual impairments, despite many of these impairments not being directly related to motor function, highlighting the complex clinical profile of this group. Although present in the ambulatory CYP, these impairments occurred at markedly lower rates.

Assessment of intellectual capacity in non-ambulatory CYP with CP is challenging, because many tools rely on speech or motor function.[21] The high proportion of non-verbal CYP in the GMFCS IV and V group may contribute to missing data. Early integration of augmentative and alternative communication systems may support more accurate cognitive assessment.[22] The complex

impairment profile of non-ambulatory CYP with CP influences treatment approaches, with those relying on comprehension, language and good cognitive ability being less applicable. Given this complex clinical picture, specialist transdisciplinary management is required.[23] All clinicians interacting with non-ambulatory CYP with CP should therefore develop foundational skills in alternative communication strategies, working collaboratively with speech and language therapists to support consistent implementation across disciplines.[24]

The correlation between GMFCS and other classification systems further supports the need for transdisciplinary care, emphasising the impact of motor severity on overall impairment profiles. The ordinal nature of these systems means that changes between levels are not equivalent, for instance, the shift from level II to III in EDACS marks a significant safety transition from safe to potentially unsafe oral feeding, with implications for respiratory safety.[25] Clinicians must be aware of these nuances within the classification scales to accurately assess risk and care requirements. We recommend routine recording of classification scores as a minimum standard for multidisciplinary assessments of CYP with CP.

Our findings suggest the extent of comorbidities among CYP with CP in New Zealand is underrepresented in ORS applications, with only six CYP funded under three criteria. As access to necessary resources is contingent upon accurate funding applications, we advocate for comprehensive documentation of impairments during funding applications to ensure adequate and appropriate resource allocation, which at present includes access to specialist orientation and mobility instructors, specialist learning, vision or hearing teachers and advisors on deaf children. These findings also highlight the necessity of continuous, holistic care that extends beyond educational settings to encompass 24-hour participation and health management. Given the significant medical and functional risks associated with non-ambulatory CP,[2] we recommend that the Ministry of Education – Te Tāhuhu o te Mātauranga reassess the scope and criteria for services within schools, ensuring they address the identified broader needs.

Our findings align with meta-analysis[26] and registry studies[2,27] demonstrating that CYP with CP frequently have multiple comorbidities related to the severity of brain injury.[5] Our data align with prior research that stratifies CYP into ambulatory and non-ambulatory categories when investigating co-occurring impairments,[4,5] showing that CYP classified as GMFCS IV and V exhibit more severe and numerous impairments than those categorised as GMFCS I–III.

The findings of this study carry important implications for future research. The heterogeneity of impairments in CYP with CP indicates that population-wide studies may overlook the nuanced clinical complexities associated across GMFCS levels. To enhance clinical relevance, we recommend that therapy and rehabilitation research focus on specific GMFCS categories or, at minimum, stratify participants into groups such as ambulatory versus non-ambulatory. Reporting cognitive and speech abilities explicitly in studies involving GMFCS IV and V CYP should become a standard practice to ensure transparency and clinical utility.

Limitations

Variation in registry aims, data collection methodologies, and ascertainment practices limits the direct comparability of CP registers internationally.[28] As highlighted in population-based CP surveillance networks, achieving high and consistent levels of case ascertainment is essential for reliable epidemiological comparison.[29] Consistent with other international CP registers, the NZCPR may face challenges capturing CYP with milder cases of CP, which may affect analysis.

Another limitation pertains to the assessment of intellectual functioning. Intellectual ability for NZCPR is clinician-rated without standardised assessment tools, which may introduce bias and potentially overestimate impairment severity, particularly among non-ambulatory CYP. Adoption of validated approaches[21] would enhance accuracy and reliability.

For impairments, only speech is directly linked to motor function and thus considered a complication of CP. In contrast, epilepsy, vision, hearing and intellect are all co-causal, due to the cause being the same cerebral insult.[2] Additional data on other relevant clinical complications, such as musculoskeletal disorders, are recorded in other registries.[30] Incorporation of such data into NZCPR would help further refine impairment differences between ambulatory and non-ambulatory CYP with CP.

Conclusion

CYP in Aotearoa New Zealand who have non-ambulatory CP have a significantly different

and more severe associated impairment profile than those who are ambulatory. Recognition of this difference is essential for clinical care, service funding, structure and future research.

COMPETING INTERESTS
Nil.

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AUTHOR INFORMATION
Karen Adams: PhD Candidate, Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand.
Dr Julia Hill: Senior Lecturer, Physiotherapy Department, Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand.
Alexandra Sorhage: Paediatric Orthopaedics, Starship Children's Health, Auckland, New Zealand.
Dr Anja Vorster: Lecturer and Data Analyst/Manager, Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand.
Dr Julie Blamires: Senior Lecturer, Nursing Department, Faculty of Health and Environmental Sciences, Auckland University of Technology, Auckland, New Zealand.

CORRESPONDING AUTHOR
Karen Adams: Faculty of Health and Environmental Sciences, Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland 0627.
E: karen.adams@aut.ac.nz

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Appendix

Appendix Table 1: Ongoing Resourcing Scheme criteria and definitions.

	Criterion number	Student need
Learning	Criterion 1—Very high needs	Total adaptation of all curriculum content.
	Criterion 5—High needs	Significant adaptation of almost all curriculum content.
Hearing	Criterion 2—Very high needs Require special assistance to engage in all face-to-face communications.	2.1 Rely totally on signing for communication.
		2.2 Rely totally on the help of a trained person for communication following a cochlear implant.
	Criterion 6—High needs Require specialist teacher contact time of at least half a day per week.	6.1 Have a severe or profound hearing impairment and need regular input from a teacher with specialist skills in deaf education to access the curriculum.
Vision	Criterion 2.3—Very high needs	Rely totally on braille for reading and writing.
	Criterion 6—High needs Require specialist teacher contact time of at least half a day per week.	6.2 Severe vision impairment and need regular input from a teacher with specialist skills in vision education to access the curriculum.
Physical	Criterion 3—Very high needs	Specialist one-to-one intervention at least weekly and/or specialist monitoring at least once a month, together with daily learning support provided by others. This support must be to help with mobility and positioning or personal care.
	Criterion 7—High needs	Specialist one-to-one intervention on average once per month and/or specialist monitoring on average once per school term together with daily learning support provided by others. This support must be to help with mobility and positioning or with personal care.
Language use and social communication	Criterion 4—Very high needs	Specialist one-to-one intervention at least weekly or specialist monitoring at least once a month, together with daily learning support provided by others. This support must be to help with needs arising from a severe disorder of both language use and appropriate social communication.
	Criterion 8—High needs	Specialist one-to-one intervention on average once per month or specialist monitoring on average once per school term, together with daily learning support provided by others. This support must be to help with needs arising from a severe disorder of both language use and appropriate social communication.

Appendix Table 1: Ongoing Resourcing Scheme criteria and definitions.

	Criterion number	Student need
Students with combined moderate needs	Criterion 9 Students with moderate to high learning needs in combination with two other needs at the moderate to high level. The three needs inter-relate to significantly reduce a student's ability to access the curriculum	9.1 Significant adaptation of most curriculum content.
		9.2 Specialist teacher intervention and monitoring to assist with a moderate hearing impairment.
		9.3 Specialist teacher intervention and monitoring to assist with moderate vision impairment.
		9.4 Specialist intervention and monitoring to assist with moderate physical needs.
		9.5 Specialist intervention and monitoring to assist with a moderate disorder of both language use and appropriate social communication.

Adapted from Ongoing Resourcing Scheme, by Ministry of Education – Te Tāhuhu o te Mātauranga.[1]

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Appendix Table 2: Clinical features of cerebral palsy classification scales.

Level	GMFCS	MACS	CFCS	EDACS
I	Walks without limitations	Handles objects easily and successfully	Effective sender and receiver with unfamiliar and familiar partners	Eats and drinks safely and efficiently
II	Walks with limitations	Handles most objects but with somewhat reduced quality and/or speed of achievement	Effective but slower paced sender and/or receiver with unfamiliar and/or familiar partners	Eats and drinks safely but with some limitations to efficiency
III	Walks using a hand-held mobility device	Handles objects with difficulty; needs help to prepare and/or modify activities	Effective sender and receiver with familiar partners	Eats and drinks with some limitations to safety; there maybe limitations to efficiency
IV	Self-mobility with limitations; may use powered mobility	Handles a limited selection of easily managed objects in adapted situations	Inconsistent sender and/or receiver with familiar partners	Eats and drinks with significant limitations to safety
V	Transported in a manual wheelchair	Does not handle objects and has severely limited ability to perform even simple actions	Seldom effective sender and receiver even with familiar partners	Unable to eat or drink safely; tube feeding may be considered to provide nutrition

GMFCS = Gross Motor Function Classification System; MACS = Manual Ability Classification System; CFCS = Communication Function Classification System; EDACS = Eating and Drinking Ability Classification System.

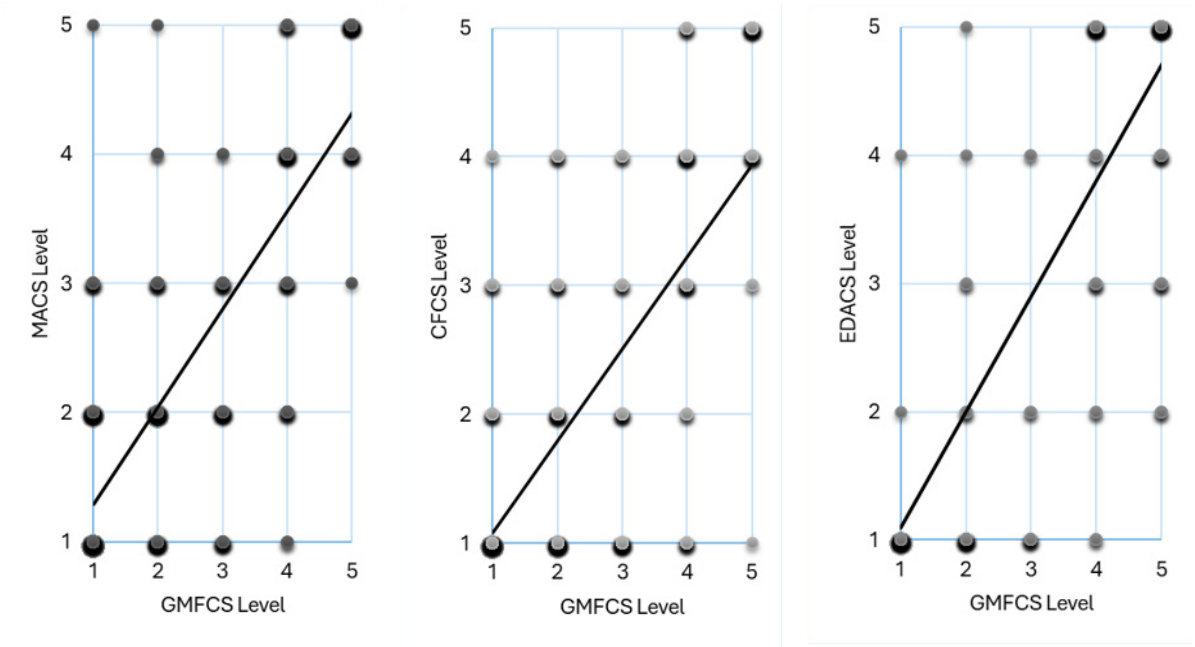
Appendix Table 3: Classification categories for associated impairments, epilepsy status, mortality and Accident Compensation Corporation status.

Criteria	Classification
Intellect	No impairment Mild Probably no impairment Probably some impairment Moderate Severe Unknown
Speech	No impairment Some impairment Non-verbal Unknown
Vision	No impairment Some impairment (wears glasses) Functionally blind Unknown
Hearing	No impairment Some impairment, including conductive hearing loss Bilateral deafness Unknown
Epilepsy status	No Yes Resolved by age 5 Unknown
Mortality	Still alive Deceased Unknown
Accident Compensation Corporation status	Yes No Pending Unknown

Appendix Table 4: Age results for data within Gross Motor Function Classification System (GMFCS) ambulatory groupings.

	GMFCS I–III	GMFCS IV and V
Mean	13.33	13.72
Median	14.00	14.00
Mode	17	16
Standard deviation	4.20	4.18
Variance	17.66	17.47
Skewness	−0.24	−0.30

Appendix Figure 1: Scatter graphs of Gross Motor Function Classification System (GMFCS) level compared with Manual Ability Classification System (MACS), Communication Function Classification System (CFCS) and Eating and Drinking Ability Classification System (EDACS), with trend line.



Appendix Table 5: Gross Motor Function Classification System (GMFCS) level I–III group impairments associations (n=808).

		Vision			Hearing			Speech			Intellect		
		No impairment	Some impairment (wears glasses)	Functionally blind	No impairment	Some impairment (includes conductive hearing loss)	Bilateral deafness	No impairment	Some impairment	Non-verbal	No impairment	Some or mild impairment	Moderate or severe impairment
Epilepsy	No	291	104	4	366	28	5	272	85	13	254	95	34
		36%	13%	0%	45%	3%	1%	34%	11%	2%	31%	12%	4%
	Resolved by age 5	22	7	0	26	3	2	14	10	1	9	15	3
		3%	1%	0%	3%	0%	0%	2%	1%	0%	1%	2%	0%
	Yes	51	57	3	89	13	3	39	43	9	31	32	41
		6%	7%	0%	11%	2%	0%	5%	5%	1%	4%	4%	5%
Vision	No impairment				342	19	7	241	72	13	225	71	33
					42%	2%	1%	30%	9%	2%	28%	9%	4%
	Some impairment (wears glasses)				141	24	3	75	57	12	66	56	34
					17%	3%	0%	9%	7%	1%	8%	7%	4%
	Functionally blind				6	1	0	3	4	1	1	4	2
					1%	0%	0%	0%	0%	0%	0%	0%	0%

Appendix Table 5 (continued): Gross Motor Function Classification System (GMFCS) level I–III group impairments associations (n=808).

		Vision			Hearing			Speech			Intellect		
		No impairment	Some impairment (wears glasses)	Functionally blind	No impairment	Some impairment (includes conductive hearing loss)	Bilateral deafness	No impairment	Some impairment	Non-verbal	No impairment	Some or mild impairment	Moderate or severe impairment
Hearing	No impairment							319	105	21	278	110	51
								39%	13%	3%	34%	14%	6%
	Some impairment (includes conductive hearing loss)							7	24	6	9	17	14
								1%	3%	1%	1%	2%	2%
	Bilateral deafness							1	2	0	2	3	4
								0%	0%	0%	0%	0%	0%
Speech	No impairment										244	55	7
											30%	7%	1%
	Some impairment										35	57	40
											4%	7%	5%
	Non-verbal										1	4	18
											0%	0%	2%

Appendix Table 6: Gross Motor Function Classification System (GMFCS) IV and V group impairment associations (n=341).

		Vision			Hearing			Speech			Intellect		
		No impairment	Some impairment (wears glasses)	Functionally blind	No impairment	Some impairment (includes conductive hearing loss)	Bilateral deafness	No impairment	Some impairment	Non-verbal	No impairment	Some or mild impairment	Moderate or severe impairment
Epilepsy	No	22	28	11	43	7	6	15	17	30	15	18	28
		6%	8%	3%	13%	2%	2%	4%	5%	9%	4%	5%	8%
	Resolved by age 5	4	6	6	9	5	2	0	4	12	0	6	9
		1%	2%	2%	3%	1%	1%	0%	1%	4%	0%	2%	3%
	Yes	29	53	59	86	18	9	2	21	99	7	24	95
		9%	16%	17%	25%	5%	3%	1%	6%	29%	2%	7%	28%
Vision	No impairment				45	6	3	7	11	29	8	13	23
					13%	2%	1%	2%	3%	9%	2%	4%	7%
	Some impairment (wears glasses)				52	15	4	4	22	44	10	15	50
					15%	4%	1%	1%	6%	13%	3%	4%	15%
	Functionally blind				42	12	4	0	5	57	0	13	54
					12%	4%	1%	0%	1%	17%	0%	4%	16%

Appendix Table 6 (continued): Gross Motor Function Classification System (GMFCS) IV and V group impairment associations (n=341).

		Vision			Hearing			Speech			Intellect		
		No impairment	Some impairment (wears glasses)	Functionally blind	No impairment	Some impairment (includes conductive hearing loss)	Bilateral deafness	No impairment	Some impairment	Non-verbal	No impairment	Some or mild impairment	Moderate or severe impairment
Hearing	No impairment							10	28	83	17	26	84
								3%	8%	24%	5%	8%	25%
	Some impairment (includes conductive hearing loss)							1	3	22	0	5	17
								0%	1%	6%	0%	1%	5%
	Bilateral deafness							0	2	11	1	4	9
								0%	1%	3%	0%	1%	3%
Speech	No impairment										10	3	0
											3%	1%	0%
	Some impairment										4	7	20
											1%	2%	6%
	Non-verbal										5	26	100
											1%	8%	29%