Rates of Developmental Coordination Disorder in Children Born Very Preterm

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Objective To examine the stability of developmental coordination disorder (DCD) throughout childhood in children born very preterm and term. Further, in the very preterm group, to compare perinatal variables and neurobehavioral outcomes at 13 years of age for children with persisting DCD and those with typical motor development.

Study design Prospective study of 180 very preterm and 73 term-born children assessed at 5, 7, and/or 13 years of age using the Movement Assessment Battery for Children, with scores ≤16th percentile used to classify DCD. Children with cerebral palsy or an IQ of <80 were excluded.

Results Children born very preterm had increased odds for DCD at 5 (OR, 5.53; 95% CI, 2.53-12.0; $P < .001$), 7 (OR, 3.63; 95% CI, 1.43-9.18; $P = .06$), and 13 years (OR, 4.34; 95% CI, 1.61-11.7; $P = .004$) compared with term-born children. The rates of DCD in very preterm children reduced from 47.9% at 5 years of age, to 28.5% at 7 years and 27.8% at 13 years of age (OR per year of age, 0.81; 95% CI, 0.75-0.87; $P < .001$), but less so for term-born children (15.3%, 10.0%, and 8.5% at 5, 7, and 13-years respectively [OR, 0.91; 95% CI, 0.75-1.09; $P = .31$]). Within the very preterm group at 13 years of age, there was evidence that children with persisting DCD performed poorer across several cognitive domains compared with children with typical motor development, with differences in the order of 0.5-1.0 SD.

Conclusions Although the rates of DCD decreased across middle childhood for both groups, the odds for DCD were consistently higher for very preterm children compared with term, with important implications for cognitive functioning in the very preterm group. *(J Pediatr 2021;231:61-7)*.

Motor impairment is a common challenge experienced by children born very preterm (<32 weeks of gestation), ranging in severity from developmental coordination disorder (DCD) to cerebral palsy (CP).[1] DCD is characterized by impaired coordination of motor skills that interferes with daily activities, which is not related to intellectual or visual impairment, or a motor-based neurologic condition.[2,3] Thus, DCD can affect a child's quality of life, limiting participation in physical, social, and academic activities.[4,5] For children born very preterm, DCD has been associated with poorer academic achievement and behavior.[2,6,7] Although the reported rates of DCD in very preterm populations vary owing to different motor impairment cut-offs and the age of outcome assessment, a systematic review found that the likelihood of DCD for children born very preterm and/or very low birth weight (<1500 g) was 6 times higher than in term-born peers using a cut-off of <5th percentile on the Movement Assessment Battery for Children (MABC), or 8 times higher when using a cut-off of <16th percentile.[2,4,5,8]

Owing to a lack of longitudinal studies, it is not clear whether the higher rates of DCD in children born very preterm reflect a permanent deficit in motor function or a delay in motor development, which will result in children eventually catching up to their term-born peers with advancing age.[9] A study of children with DCD aged 6-11 years, not necessarily born very preterm, reported that approximately 40% changed from meeting criteria for DCD to not over a 2-year period.[9] Understanding how rates of DCD change with age from school

ADHD	Attention deficit hyperactivity disorder
ASD	Autism spectrum disorder
BPD	Bronchopulmonary dysplasia
CP	Cerebral palsy
DCD	Developmental coordination disorder
MABC	Movement Assessment Battery for Children

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entry to secondary schooling and the associated comorbidities of DCD in children born very preterm is essential for planning interventions and counselling children and their parents regarding long-term outcomes.

The primary objective of this study was to examine stability of DCD in children born very preterm by comparing rates with children born at term (37-42 weeks of gestation) at ages 5, 7, and 13 years corrected age. Further, we compared perinatal variables, along with cognitive and behavioral outcomes at 13 years corrected age between children born very preterm who had a persisting classification of DCD with very preterm children who displayed typical motor development throughout childhood.

Methods

Participants were derived from a longitudinal study examining the relationship between brain development and neurodevelopmental outcomes in children born very preterm compared with term-born peers. The study recruited 224 children born at the Royal Women's Hospital, Melbourne, Australia, who were born at <30 weeks of gestation or <1250 g birthweight and free of anomalies likely to interfere with development; 77 term controls (≥37 weeks and ≥2500 g) without congenital anomalies likely to interfere with development (eg, trisomy 21) were recruited at birth from the same hospital (n = 46) or from Maternal and Child Health Centers at 2 years of age (n = 31).[10] The cohorts were assessed at term-equivalent age, 2, 5, 7, and 13 years corrected age. Because we were interested in DCD, children with CP were excluded from this study (diagnosed at 2 and/or 7 years by a pediatrician). In addition, children who had an estimated IQ of <80, assessed using the Kaufman Brief Intelligence Test, Second Edition at age 13 years or using the Wechsler Abbreviated Scale of Intelligence at 7 years, if not available at 13 years, were excluded. A conservative cut-off of <80 was chosen, consistent with other DCD studies.[11,12] Corrected age was used at all time points because chronological age results in a lowering of scores at all ages for children born preterm.[13] The study was approved by the Human Research Ethics Committees of the Royal Children's Hospital and the Royal Women's Hospital, Melbourne, Australia, with written informed consent provided by caregivers. All assessments at 5, 7, and 13 years corrected age were conducted by trained assessors blinded to the child's medical history and previous assessments.

Perinatal Data Collection

Perinatal predictors including sex, gestational age, birthweight, brain injury on ultrasound examination, bronchopulmonary dysplasia (BPD), patent ductus arteriosus, proven or suspected necrotizing enterocolitis, and proven sepsis were collected in the newborn period. The British Growth Reference was used to calculate birthweight z-scores.[14] Cranial ultrasound examination was used to detect intraventricular hemorrhage, which was recorded as the worst grade on either side according to Papile et al, and cystic periventricular leukomalacia was defined as any cystic lesion in the periventricular white matter.[15] Brain injury on ultrasound examination was defined as any injury (grade I-IV intraventricular hemorrhage or cystic periventricular leukomalacia) or moderate to severe injury (grade III/IV intraventricular hemorrhage or cystic periventricular leukomalacia). BPD was defined as oxygen requirement at 36 weeks of gestation. Brain magnetic resonance imaging was performed at term-equivalent age, with white matter injury dichotomized as none to mild or moderate to severe based on a standardized scoring system.[10,16] Social risk status was obtained from parent questionnaires using a composite measure of 6 social elements, including family structure, primary caregiver education, primary income earner occupation and employment, language spoken at home, and maternal age at birth. Each item was scored as 0, 1, or 2, and social risk was categorized as higher if the total score was ≥2.[17]

Classification of DCD

According to the *Diagnostic and Stastic Manual of Mental Disorders, 5th edition,* criteria, DCD is diagnosed when a child has poor motor performance in relation to chronological age and opportunity for skill learning; significant interference with academic achievement and activities of daily living; onset of symptoms early in the developmental period; and motor difficulties not explained by intellectual disability, visual impairment, or another neurologic condition affecting movement.[2,3] We used the MABC to assess age-related motor performance. The MABC is the most common assessment tool used to identify children at risk for motor impairment, including children born very preterm, and is considered a valid and reliable assessment of motor performance in children aged 3-16 years.[2,5,18] At 5 years corrected age, motor performance was assessed using the first edition of the MABC, and at 7 and 13-years corrected age, the second edition was used.[18,19] Both editions of the MABC include 3 subscales: manual dexterity, aiming and catching, and balance. After excluding those with CP (n = 14) and/or an IQ of <80 (n = 19), children were classified as having DCD if they scored ≤16th percentile on the MABC, consistent with previous studies of this cohort.[11] Children who scored >16th percentile on the MABC were classified as displaying typical motor development. We did not directly measure the impact of motor functioning on the child's daily functioning; however, the MABC assesses child functioning on a range of everyday activities and thus poor performance is highly likely to reflect difficulties in leisure, play, and typical vocational activities.

Children with MABC data at all 3 timepoints were grouped into 1 of 5 categories, including persisting DCD, classified as having DCD at all timepoints; remitting DCD, classified as having DCD at age 5 or 7 years but typical motor development at 7 or 13 years; delayed onset DCD, typical motor development at time at age 5 or 7 years but classified with DCD at time point 7 or 13 years; unstable, classified as having DCD at age 5 years, typical motor development at 7 years,

and DCD at 13 years or vice versa; or persisting typical motor development, classified as typical motor development at all timepoints.

Neuropsychological Test Performance at 13 Years of Age

At 13 years corrected age, children participated in a neuropsychological examination. The Kaufman Brief Intelligence Test, Second Edition, was administered to provide an estimate of general intellectual ability (mean, 100 ± 15).[20] The Digit Recall and Backward Digit Recall subtests from the Working Memory Test Battery for Children were used to assess immediate verbal memory and verbal working memory, respectively (mean, 100 ± 15). The Score! and Map Mission subtests from the Test of Everyday Attention for Children were used to assess sustained and selective attention, respectively (mean, 10 ± 3).[21] Two subtests from the Behavioral Assessment of the Dysexecutive System for Children, the Zoo Map Test (high demand condition), and the Six Part Test were administered to assess planning and organizational skills (mean, 10 ± 3).[22] The Behavior Rating Inventory of Executive Function, a parent-report questionnaire, was used to assess behavioral manifestations of children's executive functions.[23] In the present study, we used the Global Executive Composite, Behavioral Regulation Index, and Metacognition Index (mean, 50 ± 10). For all measures, higher scores reflected better outcomes, except the Behavior Rating Inventory of Executive Function, where higher scores reflected poorer outcomes.

A diagnosis of attention deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) was made by a clinical psychologist according to *Diagnostic and Stastic Manual of Mental Disorders, 5th edition*, criteria using information during a parent interview with the Development and Well-Being Assessment.[3,24]

Statistical Analyses

Data were analyzed using Stata 15.0 (StataCorp). Perinatal characteristics of participants are reported using summary statistics. Rates of DCD were compared with typical motor development between the groups (very preterm and term) at each age using logistic regression. The change in the rates of DCD over time was examined using mixed regression models, with group and age at assessment (in months) as fixed effects and a random effect for individuals; an interaction term was included to assess if the rate of change DCD over time differed between birth groups. All children were included in the mixed models analysis, irrespective of missing an assessment at 1 or 2 timepoints.

The rates of persisting typical motor development, persisting DCD, remitting DCD, delayed onset DCD, and unstable DCD were described in the very preterm and term-born groups. Because ASD and ADHD are known to co-occur with DCD, we also reported the number of children with ASD and ADHD at 13 years in each of these categories.

For the very preterm group, perinatal predictors of persisting DCD compared with persisting typical motor development at all ages were examined using logistic regression,

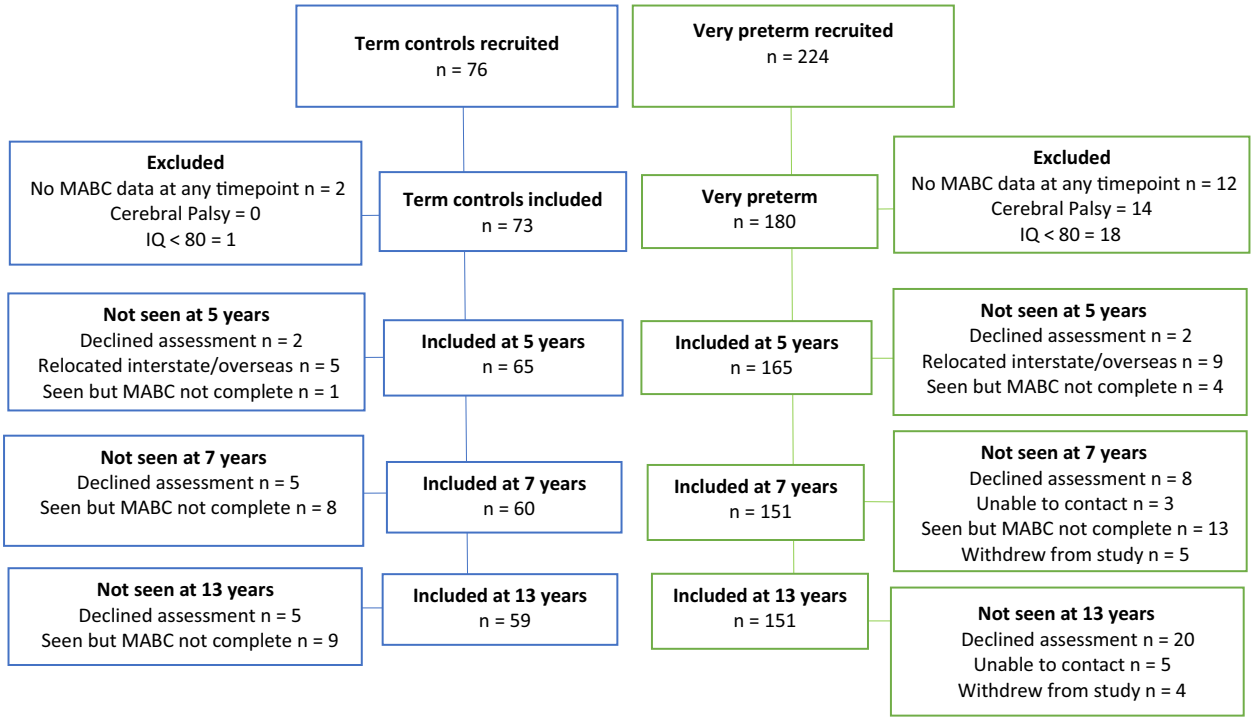

Figure. Participant flowchart.

Table I. Perinatal characteristics for the very preterm and term groups

Characteristics	Very preterm (n = 180)	Term (n = 73)
Male sex	89 (49.4)	34 (46.6)
Gestational age, completed weeks	27.5 ± 1.8	39.2 ± 1.3
Birthweight, g	979 ± 222	3325 ± 518
Birthweight z score	−0.48 ± 0.88	0.12 ± 0.90
Multiple birth	72 (40.0)	4 (5.5)
Grade III/IV IVH and/or cystic PVL	10 (5.6)	0 (0)
Moderate to severe white matter injury on MRI at term-equivalent age	21 (11.7)	0 (0)
BPD	6 (33.3)	0 (0)
Patent ductus arteriosus	92 (51.1)	0 (0)
Proven sepsis	64 (32.3)	0 (0)
Higher social risk	92 (56.4)*	23 (32.9)†

IVH, intraventricular hemorrhage; *PVL*, periventricular leukomalacia; *MRI*, magnetic resonance imaging; *NEC*, necrotizing enterocolitis.
Values are number (%) or mean ± SD.
*n = 163 because data were incomplete for some participants.
†n = 71 because data were incomplete for some participants.

initially using univariable models before combining those variables with strong evidence of an association ($P < .05$) on multivariable analyses. Differences in cognitive and behavior outcomes at 13 years of age were compared between the very preterm group with persisting DCD and persisting typical motor development using linear regression. Outcomes at 13 years for the children born at term who consistently had no motor impairment were reported as a reference group.

All regression models were fitted using generalized estimating equations and are reported with robust standard errors to allow for clustering of multiple births within a family. Regression analyses are reported unadjusted, and also adjusted for sex and social risk. Analysis were repeated excluding children with ASD or ADHD at 13 years of age.

Results

Of the recruited participants in the original cohorts, 180 children born very preterm and 73 term-born children were eligible (assessed on MABC, did not have CP, IQ of ≥80). Of these children, follow-up rates at 5, 7, and 13 years were 90.9%, 83.0%, and 85.3%, respectively. Follow-up rates reduced over time as children moved interstate or internationally, or withdrew from the study (Figure). The perinatal characteristics of the very preterm and term groups included in this study are described in Table I.

Rates of DCD over Time in Children

The rate of DCD in the very preterm group was 48% at 5 years, 30% at 7 years, and 28% at 13 years, and for the term controls the rate of DCD ranged was 15% at 5 years, 10% at 7 years, and 8% at 13 years (Table II). Children born very preterm had a ≥3 times higher odds of DCD at all ages compared with term-born controls (Table II). There was evidence that the odds of DCD decreased over time for children born very preterm (OR per year of age, 0.81; 95% CI, 0.75-0.87; $P < .001$), but not for term-born children (OR per year of age 0.91; 95% CI, 0.75-1.09; $P = .31$). However, there was little evidence that the effect of time varied between groups (interaction $P = .19$).

Consistency in DCD Classification over Time

The majority of children were stable in terms of DCD classification from 5 to 13 years (very preterm group, 62%; term controls, 81%) (Table III). Of the children born very preterm, approximately one-half (47%) were classified as having persisting typical motor development, and 17% were classified as having persisting DCD. Of the remaining children born very preterm, approximately 1 in 5 (22%) were classified as having remitting DCD, and the remainder were classified as having delayed onset DCD (7%) or unstable DCD (7%). In the term-born group, 83% had persisting typical motor development, 9% were classified as having remitting DCD, 4% with delayed DCD, and 4% with unstable DCD. None of the term-born group had a persisting DCD classification. An assessment of ADHD and ASD symptomology was available for 93 very preterm and 38 term children. Of the 4 children born very preterm who had ASD, 1 had typical motor development, 1 remitting DCD, and 2 delayed DCD, whereas the 1 term born child with ASD had typical motor development. Of the 9 children with ADHD born very preterm there was a spread of classifications across all profiles (typical motor development, n = 2; persisting DCD, n = 2; remitting DCD, n = 2; delayed onset DCD, n =3; and unstable DCD, n = 1), whereas the 1 term-born child with ADHD had typical motor development.

Table II. Comparison of the rates of DCD in children born very preterm and term at 5, 7, and 13 years

Ages (years)	DCD, n/N (%)		OR (95% CI)	*P* value	aOR (95% CI)	*P* value
	Very preterm	Term				
5	79/165 (47.9%)	10/65 (15.3%)	5.53 (2.53-12.0)	<.001	7.00 (2.84-17.3)	<.001*
7	43/151 (28.5%)	6/60 (10.0%)	3.63 (1.43-9.18)	.06	3.33 (1.19-9.27)	.021†
13	42/151 (27.8%)	5/59 (8.5%)	4.34 (1.61-111.7)	.004	4.00 (1.47-10.9)	.007‡

ORs from logistic regression models fitted using generalizing estimating equations to allow for clustering of multiples; aORs account for sex and social risk in model.
*n = 186.
†n = 184.
‡n = 204.

Table III. Changes in DCD classifications throughout childhood in very preterm and term-born children

	Very preterm (n = 127)	Term (n = 46)
DCD classifications	None vs DCD (n = 127)	None vs DCD (n = 46)
Persisting typical motor development	60 (47.2)	38 (82.6)
Persisting DCD	21 (16.5)	0 (0)
Remitting DCD	28 (22.1)	4 (8.7)
Delayed onset DCD	9 (7.1)	2 (4.4)
Unstable	9 (7.1)	2 (4.4)

Values are number (%).

Perinatal Characteristics Associated with Any DCD

There was strong evidence that moderate to severe white matter injury, BPD, and patent ductus arteriosus were associated with having persisting DCD on univariable analysis, but there only remained evidence for an association with moderate to severe white matter injury in the multivariable analysis (**Table IV**; available at www.jpeds.com).

Neuropsychological Outcomes at 13 Years Corrected Age

Within the very preterm group at 13 years, there was strong evidence that children with persisting DCD performed poorer across several cognitive domains compared with children with persisting typical motor development. Clinically relevant group differences (ranging from approximately 0.5 to almost 1.0 SD) were observed on tests of general intelligence, immediate verbal memory, verbal working memory, and selective and sustained attention, as well as behavioral aspects of executive function (**Table V**; available at www.jpeds.com).

All analyses were repeated excluding children with ASD and ADHD. The magnitude and strength of evidence for relationships were similar when the analysis was repeated excluding these children.

Discussion

This study confirms that there is a higher rate of DCD in children born very preterm compared with controls, but importantly adds to the understanding of DCD diagnosis over time from childhood to early adolescence in both very preterm and term-born children. We found at least a 3-fold increase in the odds of DCD for children born very preterm compared with children born at term at 5, 7, and 13 years corrected age. The rate of DCD decreased with age for both groups. Almost one-quarter of the children born very preterm changed classifications from DCD to typical motor development from 5 to 13 years of age. However, in very preterm children, the change in the DCD classification over time was not always associated with improved motor functioning; a minority of children were classified with DCD at a later timepoint, or had variable classifications over time. For children born at term, the rates of DCD remained relatively low and stable over time. Interestingly, no children born at term had a persisting DCD classification.

Our findings are consistent with previous research investigating the stability of a DCD diagnosis. Wilson et al found only about one-half of the primary school age children with an initial diagnosis of DCD (ie, 44%) or typical motor development (56%; total n = 186; DCD n = 52) had the same diagnosis 2 years later, and a study in the 1990s with a much smaller sample size (n = 17) of children with clumsiness reported that approximately 80% had persisting symptoms between 6 and 16 years of age.[9,25] Neither of these studies were focused on children born very preterm, which may explain some of the differences in their conclusions with our study, where approximately 2 of 3 children born very preterm and 4 of 5 term-born children had the same classification at all 3 ages of assessment.

Moderate to severe white matter injury was the only variable associated with persisting DCD at all ages compared with persisting typical motor development at any age in the children born very preterm on multivariable analysis, although there was also evidence of an association with BPD in univariable analyses. Moderate to severe white matter injury occurs in approximately 20% of children born very preterm and although it is often associated with CP, it is increasingly being recognized as an early biomarker for DCD.[10,16,26,27] Alterations in white matter, particularly in the corticospinal tract, are seen in young adults with DCD, highlighting the strong association between brain structure and motor function.[28,29] Other medical risk factors that have been associated with DCD for children born very preterm or very low birth weight (<1250 g) in the literature include male sex, low birth weight, postnatal corticosteroid exposure, and BPD.[30-32] Many of the studies to date have not focused on longitudinal follow-up and although some of these perinatal risk factors may be associated with early DCD, ours is the first study to examine perinatal risk factors for DCD longitudinally into adolescence in children born very preterm.

DCD is known to be associated with emotional, social, and learning difficulties.[2] In our study, children born very preterm who had persisting DCD performed between 0.5 and 1.0 SD below their peers at 13 years corrected age on measures of IQ, immediate memory, working memory, sustained attention, selective attention, and behavioral symptoms of executive function compared with children with persisting typical motor development. Our findings are consistent with other research that has shown that children born very preterm with DCD compared with children born very preterm without DCD have poorer cognitive outcomes at 6.5 years, and academic outcomes at 8 years; our study is unique in that we focused on children with persisting DCD.[6]

Our study has important implications for families of children born very preterm, clinicians, and researchers. We have shown that the classification of DCD in children born very preterm may change over time, much more likely than children born at term. The reasons for this are not known, but could reflect a delay in motor development for some children

born very preterm rather than a permanent motor impairment. Also, given the increased rate of DCD in the very preterm group, there were more children born very preterm in the subthreshold to post-threshold range of the cut-off score than term controls, increasing the likelihood of classification change. Regardless, it is essential to monitor motor function longitudinally in both clinical practice and in research studies of children born very preterm. The findings from our study support the need for repeated assessments of motor skills using standardized assessments among children born very preterm, because the diagnosis of DCD may change with time. The differences in cognitive outcomes between children born very preterm with and without DCD of between 0.5 and 1.0 SD are clinically relevant and likely to have an impact on academic performance. These findings highlight the importance of a comprehensive neuropsychological examination for children born very preterm with DCD, but also emphasize the importance of early surveillance of these children to ensure that they access appropriate interventions early in childhood.

The strengths of the current study include the excellent retention rates of both groups from birth to 13 years. Although we did not formally assess the functional implications of each child's motor impairment, our assessment of motor functioning (MABC) included a sample of everyday activities, providing us with information that this DCD criterion was satisfied. Regarding the other DCD diagnostic criteria, we excluded children with low IQ and/or CP, and no child had a neurologic condition affecting the motor system (based on close surveillance since birth). In our secondary aims, we examined the developmental outcomes associated with persisting DCD and typical motor development at all timepoints. This is a strength of the study, because only children with persisting DCD are likely to have a true motor deficit rather than a delay. However, it was also a limitation because it resulted in a smaller sample size and decreased the study's power to identify associations between DCD and neurobehavioral impairment.

Another limitation is that different editions of the MABC were used at 5 vs 7 and 13 years, owing to the release of the second edition of the MABC during the course of this longitudinal study and we chose to use the most current edition. The rates of DCD decreased in both groups from 5 to 7 and 13 years, which could be due to the differences between the 2 editions of this measure and the standardization samples. Further, we used a high cut of the MABC for DCD of ≤16th percentile, because the MABC-2 does not have a score of the 15th percentile when standard scores are converted to percentiles, with the 16th percentile being the closest number to the 15th percentile, followed by the 9th percentile. The high cut-off of ≤16th is associated with differences in a range of outcomes, highlighting the importance of milder motor impairment. Although the evidence for a group-by-time interaction was weak, we had hypothesized that children born very preterm might display improved motor function over time; therefore, we examined rates of change in DCD in the very preterm and term-born controls separately. The rate of DCD in the term control group was relatively low; however, the sample size was small, which limits the power to detect change in that group over time. Future studies using larger samples of both very preterm and term-born children are needed to better understand these relationships. Finally, we did not assess the effects of any developmental interventions on change over time because we did not have sufficient information on type of therapies, when they commenced, dosage, or duration.

The diagnosis of DCD decreased across middle childhood for both groups, but more so for the children born very preterm than controls. However, rates of DCD remained significantly higher throughout childhood and into adolescence in children born very preterm than in controls. For very preterm children, persisting DCD compared with typical motor development throughout childhood was associated with cognitive difficulties, which highlights the importance of comprehensive multidisciplinary follow-up for children born very preterm. ■

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Table IV. Perinatal predictors of persisting DCD vs persisting typical motor development in children born very preterm

	Preterm		Univariable		Multivariable	
Variables	**Persisting DCD (n = 21)**	**Persisting typical motor development (n = 60)**	**OR (95% CI)**	***P* value**	**OR (95% CI)**	***P* value**
Male sex	12 (57.1)	29 (48.3)	1.82 (0.71 to 4.70)	.22	N/A	N/A
Grade III/IV IVH and/or cystic PVL	2 (9.5)	1 (1.67)	3.99 (0.58 to 27.4)	.159	N/A	N/A
Moderate to severe white matter injury	6 (28.6)	2 (3.3)	9.60 (2.02 to 45.6)	.004	8.45 (2.34 to 30.5)	.001
BPD	11 (52.4)	14 (23.3)	3.99 (1.42 to 11.2)	.009	2.45 (0.82 to 7.35)	.11
Patent ductus arteriosus	14 (66.7)	28 (46.7)	2.48 (0.96 to 6.38)	.06	N/A	N/A
Proven sepsis	7 (33.3)	21 (35.0)	1.11 (0.46 to 2.67)	.82	N/A	N/A
Higher social risk	12 (60.0)	30 (53.6)	1.18 (0.41 to 3.50)	.76	N/A	N/A
	Any DCD	**No DCD**	**Mean Diff (95% CI)**	***P* value**	**Mean Diff (95% CI)**	***P* value**
Gestational age, weeks	26.8 ± 2.5	27.6 ± 1.6	−0.83 (−1.95 to 0.30)	.15	N/A	N/A
Birthweight z score	−0.82 ± 1.10	−0.42 ± 0.90	−0.42 (−0.93 to 0.08)	.10	N/A	N/A

IVH, intraventricular hemorrhage; *PVL*, periventricular leukomalacia; *NEC*, necrotizing enterocolitis; *N/A*, not included in multivariable model.
The multivariable model only includes variables in the univariable model that were significantly related to DCD.
Values are number (%) or mean ± SD unless otherwise indicated.

Table V. Neurobehavioral outcomes for term and very preterm children with persisting DCD vs persisting typical motor development.

	Term	Very preterm					
	No DCD (n = 38)	Persisting DCD (n = 21)	Persisting typical motor development (n = 60)	Unadjusted difference between preterm groups		Adjusted difference between preterm groups	
Neurobehavioral outcomes	Mean (SD)	Mean (SD)	Mean (SD)	Mean diff (95% CI)	*P* value	Mean diff (95% CI)	*P* value
General intelligence							
IQ composite	111.7 (12.7)	98.2 (13.5)	106.6 (12.0)	−8.3 (−14.6 to −2.1)	.010	−7.5 (−13.7 to −1.3)	.018*
Memory							
Immediate memory, digit span forward	100.8 (15.6)	89.1 (12.6)	101.1 (16.6)	−12.1 (−19.2 to −4.9)	.001	−10.3 (−16.7 to −3.9)	.002*
Working memory, digit span backwards	99.0 (12.9)	85.0 (14.6)	98.0 (13.2)	−13.0 (−19.8 to −6.2)	<.001	−13.2 (−20.6 to −5.9)	<.001*
Attention							
Sustained attention score	8.45 (3.16)	7.00 (3.53)	9.47 (3.15)	−2.46 (−4.11 to −0.82)	.004	−2.35 (−3.96 to −0.73)	.004*
Selective attention, map mission	8.58 (2.75)	5.38 (3.34)	8.25 (2.64)	−2.89 (−4.3 to 1.48)	<.001	−2.63 (−4.18 to −1.08)	.001*
Executive function							
Planning, zoo map 1	10.11 (2.91)	9.10 (4.01)	8.62 (3.56)	0.48 (−1.38 to 2.33)	.61	0.59 (−1.22 to 2.41)	.52*
Planning and monitoring, 6 parts test	7.71 (2.55)	7.81 (3.14)	7.63 (3.05)	0.18 (−1.37 to 1.76)	.82	−0.20 (−1.56 to 1.16)	.72*
Parent report†							
Global executive composite	49.7 (11.4)	65.4 (10.8)	51.7‡ (11.5)	13.7 (7.8 to 19.5)	<.001	12.5 (7.4 to 17.6)	<.001§
Behavioral regulation index	49.1 (11.2)	63.5 (10.9)	50.2‡ (10.9)	13.3 (7.1 to 19.5)	<.001	13.2 (6.8 to 19.7)	<.001§
Metacognition index	50.2 (10.9)	64.2 (10.0)	52.3‡ (11.6)	12.3 (6.5 to 19.1)	<.001	11.0 (6.2 to 15.7)	<.001§
Child report†							
Global executive composite	48.7 (12.0)	53.7¶ (12.0)	46.9** (12.0)	6.8 (0.4 to 13.3)	.031	6.4 (−0.2 to 12.5)	.049††
Behavioral regulation index	46.2 (10.9)	52.7¶ (13.4)	46.7** (12.1)	6.0 (−0.5 to 12.5)	.07	5.8 (−0.9 to 12.5)	.090††
Metacognition index	50.9 (12.0)	54.8¶ (12.3)	47.4** (11.0)	7.4 (1.5 to 13.3)	.013	6.7 (0.6 to 12.8)	.032††

*n = 76.
†Higher scores are indicative of poorer outcomes. Adjusted results are adjusted for social risk and sex.
‡n = 53.
§n = 70.
¶n = 19.
**n = 60.
††n = 74.