

USA. ⁶Physical Medicine and Rehabilitation, University of Michigan, Ann Arbor, MI, USA

Objective: Infant motor development is a robust predictor of long-term developmental outcomes, especially in infants at high risk for neurodevelopmental impairments, such as those born preterm (PT, gestational age [GA] <37 weeks). Although direct assessments of motor development are available, they are infrequently applied by pediatricians in routine screening of the broader population of infants born preterm. Parent ratings, such as the Ages and Stages Questionnaire, 3rd Ed., can be used to screen for motor delays. However, this and other existing screening measures focus on whether children have reached milestones based on pre-established cutoffs, rather than on assessing development along a continuum of ability. The present study examined the validity of the Motor domain of the recently developed caregiver report screening tool, PediaTrac™, in distinguishing infants born PT from infants born full term (FT, GA ≥37 weeks) across the first 6 months of life. The reliability and factor structure of this motor scale were also evaluated.

Participants and Methods: PediaTrac™ is a web-based caregiver report assessing infant development across multiple domains, including motor functioning. This study reports on results from the PediaTrac™ Motor domain for the study sample of 571 caregiver-infant dyads (240 PT, 331 FT). Caregivers rated their infants on age-targeted motor skills during the newborn period (NB, defined as term equivalent for the PT group) and at 2-, 4-, and 6-months after the NB period. Item Response Theory (IRT) methods were applied to assess the reliability (i.e., information) of caregiver-reported motor skills at each age. Using the IRT item parameters of discrimination and difficulty, items were selected for inclusion and to estimate theta, an index of the latent trait, motor ability, for each infant. Analyses conducted at each age assessed the effects of group, sex, and group x sex on the motor trait. Scale reliabilities and factor structure were also examined.

Results: The PT group had significantly higher scores than the FT group on the motor trait at the NB period but significantly lower scores by 4 and 6 months, suggesting slower development of motor skills in the PT group. Means (SD) theta scores (similar to z scores) for the PT and FT groups, respectively, were .14 (.88) and -.05 (.91) for the NB period, -.01 (.90) and .01 (.91)

for 2 months, .20 (.90) and .36 (.88) for 4 months, and .46 (.78) and .66 (.89) for 6 months. Effects for sex and group x sex interactions were not significant. Reliabilities, estimated at a point close to mean theta, were .94, .93, .96, and .98 at the NB, 2-, 4-, and 6-month periods, respectively. Exploratory factor analyses revealed evidence for a single primary motor factor and multiple second-order factors at each age.

Conclusions: Findings provide strong support for applications of the caregiver reported PediaTrac™ motor scales in screening infants born PT and other at-risk populations for early delays or abnormalities in motor development. Advantages of this method include its ease of administration, sensitivity to developmental change, and promise in assessing subdomains of motor skill.

Categories: Prenatal/Perinatal Factors/Prematurity

Keyword 1: assessment

Keyword 2: child development disorders

Keyword 3: prematurity

Correspondence: H. Gerry Taylor, Abigail Wexner Research Institute at Nationwide Children's Hospital, hudson.taylor@nationwidechildrens.org

6 Preschool Motor Skills as Predictors of School Age Cognitive and Behavioral Outcomes in Children Born Very Preterm

Jessica J. Quach¹, Daphne M. Vrantisidis¹, Kerry Orton¹, H. Gerry Taylor^{1,2}

¹Abigail Wexner Research Institute, Nationwide Children's Hospital, Columbus, Ohio, USA.

²Department of Pediatrics, The Ohio State University, Columbus, Ohio, USA

Objective: Motor weaknesses are frequently observed in very preterm children (VPT; gestational age [GA] < 30 weeks) prior to school entry and may serve as markers of risk for school-age cognitive and behavioral deficits. The aims of the present study were to: (1) determine if weaknesses in preschool motor skills in children born VPT and a full-term comparison group (FT; GA > 37 weeks) are associated with lower scores on tests of cognition and caregiver ratings of behavior in

early elementary school; (2) explore the possibility that weaknesses in preschool motor abilities predict less positive changes in cognition and behavior across follow-up; and (3) determine if associations between preschool motor skills and later cognitive and behavioral functioning differed for the two groups.

Participants and Methods: Thirty-eight children born VPT and thirty born FT completed measures of motor skills, global cognitive ability, and executive function and caregivers completed questionnaires assessing children's behavior at age 4 (T1; $M = 4.71$ years) and at ages 7 or 8 (T2; $M = 7.87$ years). ANCOVAs were used to examine group differences in cognitive and behavioral outcomes. Hierarchical regressions were conducted to examine the Movement Assessment Battery for Children, 2nd Ed. (MABC-2) total score at T1 as a predictor of T2 scores on cognitive tests and behavior ratings (step 1). Covariates included sex and socioeconomic status (step 1). Outcomes included the Differential Ability Scales-II (DAS-II), NIH Toolbox Dimensional Change Card Sort (DCCS), Behavior Rating Inventory of Executive Function Global Executive Composite (BRIEF-GEC), Emotion Regulation Checklist, and Social Communications Questionnaire at T2. T1 status on the T2 cognitive and behavioral outcomes was included as a predictor to determine if T1 MABC-2 predicted change in these outcomes from T1 to T2 (step 2). In separate analyses, T1 MABC-2 x group interactions were included to determine if associations of the T1 MABC-2 with T2 outcomes differed by group.

Results: The VPT group had significantly lower scores than the FT group on the DAS-II at T2. Lower scores on the T1 MABC-2 were significantly associated ($p < .05$) with lower scores on the DAS-II and DCCS and more executive dysfunction on the BRIEF-GEC. These associations were stronger for the VPT group than for the FT group for the T2 DAS-II Global Cognitive Ability and Verbal composites but not for the other outcomes. Lower scores on the T1 MABC-2 were associated with less positive change on the DAS-II Nonverbal composite and the DCCS and increased executive dysfunction on the BRIEF-GEC.

Conclusions: Weaknesses in motor abilities at 4 years of age were associated with cognitive and behavioral difficulties at early school age, both for children born VPT and those born FT. These weaknesses were also associated with less favorable changes in cognition and behavior across the transition from preschool to

early school age. Findings suggest that early motor abilities provide a marker of generalized developmental impairment or that early motor impairments have cascading effects on development. These results support the need for early screening and intervention for motor deficits in preschoolers born either VPT or FT.

Categories: Prenatal/Perinatal Factors/Prematurity

Keyword 1: prematurity

Keyword 2: cognitive functioning

Keyword 3: executive functions

Correspondence: Jessica J. Quach Abigail Wexner Research Center, Nationwide Children's Hospital jessica.quach@nationwidechildrens.org

7 Executive Function is Associated with the Development of Math Performance in Children Born Very Preterm

Simonne E Collins^{1,2}, Alice C Burnett^{3,4}, Philippa Pyman^{1,2}, Leona Pascoe^{1,2}, Kristina M Haebich^{2,4}, Jeanie L Y Cheong^{2,5,4}, Lex W Doyle^{2,5,4}, Deanne K Thompson^{2,4,6}, Peter J Anderson^{1,2}

¹Turner Institute for Brain and Mental Health, School of Psychological Sciences, Monash University, Melbourne, VIC, Australia. ²Murdoch Children's Research Institute, Melbourne, VIC, Australia. ³alice.burnett@mcri.edu.au, Melbourne, VIC, Australia. ⁴The University of Melbourne, Melbourne, VIC, Australia. ⁵The Royal Women's Hospital, Melbourne, VIC, Australia. ⁶Florey Institute of Neuroscience and Mental Health, Melbourne, VIC, Australia

Objective: To examine associations between executive function (EF) domains (attentional control, information processing, cognitive flexibility, and goal setting) and math computation performance at 7 and 13 years in children born very preterm (VP; <30 weeks' gestation), and secondly, to investigate the associations of 7-year EF with change in math performance from 7 to 13 years.

Participants and Methods: In the prospective, longitudinal Victorian Infant Brain Studies (ViBeS) cohort of children born VP, assessment of EF and math performance was undertaken at 7 ($n = 187$) and 13 years ($n = 174$). Univariable and multivariable regression models (including