

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

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

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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

all domains of EF) were used to examine associations between EF domains at both timepoints with math performance, as well as associations between EF at 7 years with change in math from 7 to 13 years.

Results: At 7 and 13 years, all EF domains were positively associated with concurrent math performance, with multivariable models finding information processing, cognitive flexibility and goal setting independently contributed to math performance at both ages. All EF domains were positively associated with improvement in math performance from 7 to 13 years, with multivariable models finding that goal setting contributed unique variance to improvement in math over this period.

Conclusions: This study provides evidence for a strong, consistent association between EF and math performance in children born VP and emphasizes the importance of goal setting capacity for later improvement in math performance.

Categories: Prenatal/Perinatal Factors/Prematurity

Keyword 1: mathematics ability

Keyword 2: executive functions

Keyword 3: prematurity

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8 Effects of Birthweight and Home Environment on Cognitive Executive Functions at Preschool-Age of VLBW / ELBW Preterm Children with Normal Early Development

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Objective: Preterm children with very low birthweight (VLBW) / extremely low birthweight (ELBW) with normal early development had been found poorer executive functions (EFs) at

preschool-age (Ni, Huang & Guo, 2011). The previous study found that the risks of deficits in EFs at preschool-age of preterm children can be attenuated by more supportive home environment (Taylor & Clark, 2016). However, former studies didn't investigate the effect of birthweight and home environment on cognitive EFs of preterm children simultaneously, especially those with normal early development. The present study aims to investigate the predictive effect of birthweight and home environment on the cognitive EFs of VLBW / ELBW preterm children.

Participants and Methods: The preterm children were recruited from the Premature Baby Foundation of Taiwan. Inclusion criteria were their scores of Bayley Scales of Infant and Toddler Development, second or third edition at 12 and 24 months, and Wechsler Preschool and Primary Scale of Intelligence, Revised Edition at 5 years old were higher than 70. Exclusion criteria were visual impairment, hearing impairment, and cerebral palsy. There was a total of 287 preterm children with age 6 recruited in the present study. Preterm children were then divided into VLBW group (n=202, birthweight between 1001-1500g) and ELBW group (n=85, birthweight less than 1000g). The typical children included 89 term-born healthy and typically developing children with age 6, who were recruited from comparable social status families in the community.

Four types of cognitive EFs including 22 indicators were assessed. Inhibition ability including 8 indicators was assessed through Comprehensive Nonverbal Attention Test Battery (CNAT), cognitive flexibility including 6 indicators was assessed through Wisconsin Card Sorting Test (WCST), working memory including 2 indicators was assessed through Digit Span Subtest of Wechsler Intelligence Scale for Children-IV (WISC-IV) and Knox's Cube Test (KCT), planning ability including 6 indicators was assessed through Tower of London (ToL). The home environment was assessed through Home Observation for Measurement of the Environment (HOME), Revised edition. Data were analyzed with Stepwise Regression.

Results: Results showed that the regression model with birthweight significantly predicted 83.3% of planning ability indicators, 83.3% of cognitive flexibility indicators, and 50% of working memory indicators. Among indicators mentioned above, birthweight has been found the greatest predictive effect on summation-of-