



## PRI MIDDLE SCHOOL FOLLOW-UP STUDY



Students in middle grades mathematics face the critical transition from arithmetic to algebra (National Mathematics Advisory Panel, 2008). Many do not make this transition effectively, especially those who come from low-income families.

Some math difficulties might be identified early in children's school careers. Longitudinal assessments may reveal important indicators of children who need earlier intervention and/or different instructional approaches to reduce later difficulties.

The ***Middle School Follow-up*** longitudinal study is investigating middle grades math achievement and other cognitive abilities from pre-k through middle school. Vanderbilt University's Peabody Research Institute (PRI) followed students from pre-k through 1st grade. New funding allows us to follow these same students from 5th through 8th grade. This project will provide important insights into factors contributing to success in math of children at risk for academic difficulties. It also provides a deeper understanding of the relationships between math achievement and other specific cognitive skills such as executive function, approximate quantity estimation, and visuospatial reasoning.





### Participating Children

Parental consent was obtained in spring 2014 for 523 students.

- ❑ 76 of the students were in 4th grade
- ❑ 447 of the students were in 5th grade

Students were in 76 MNPS elementary and middle schools with 164 participating math teachers.

### Student Assessments

From February 2014 to May 2014, 521 students participated in two different assessment sessions that included:

- ❑ Standardized General Math Assessments: 1) Key Math 3 Diagnostic Assessment (Numeration, Algebra, and Geometry); 2) Woodcock Johnson Achievement Battery III (Quantitative Concepts)
- ❑ Nonstandard Math Assessments: 1) Pre-Algebra Task (Functional Thinking); 2) Feelings About Math Survey
- ❑ Specific Neuro-Cognitive Measures: 1) Domain General: Executive Function and Visuospatial Skill (Working Memory and Attention Shifting); 2) Math-specific: Symbolic and Non-symbolic Number Comparison Tasks

### Teacher Ratings

Also in the spring of 2014, math teachers of participating students were asked to answer questions about themselves, their math classes, and the specific students in the study. Student-specific questions generally focused on math and executive function skills in the classroom.

### Spring 2014 Key Findings

In the short time since assessments and ratings were completed, we have been able to learn a great deal about the performance of these students.

- On all Key Math subscales, the average student in this sample is scoring almost 2 years below where he/she can be expected to score based on age, and more than a full grade below where he/she can be expected to score based on grade level. This pattern is worse for Geometry, where the average student is scoring 2.5 years below age expectations, almost 2 grades below grade expectations.
- On the Woodcock Johnson math subscale, the average MNPS student in our sample scored almost 10 points below the expected score of 100.
- Most students tended to feel highly positively about math, including how much they liked math and how competent they felt they were in math.
- Children's math skills in the early grades (pre-k through 1st) are strongly correlated with their 5th grade performance.
- Students who scored the farthest behind last year also appeared to have difficulties with the neuro-cognitive assessments. This combination suggests the possibility of math dyscalculia, a very specific math difficulty, for more than 10% of the group.

### Directions for the Future

PRI is continuing to examine this extensive dataset. We are learning more about the math performance of students, the interrelationships among skills in 5th grade, and the relationship between pre-k/early elementary math skills and later achievement.

### 2014-2015 Project Timeline

#### FALL

##### October-November

- \* Project reminders mailed to parents
- \* Parent phone surveys on support for math in the home administered
- \* School visits with principals and staff to establish assessment schedules

#### WINTER/SPRING

##### January-April

- \* Schools confirm enrollment of students
- \* Schedules coordinated with principals and teachers
- \* Individual students assessed by trained assessors
- \* Math teachers complete brief survey and student ratings

### For More Information:

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