University of Virginia CASTL Curry School of Education

Center for Advanced Study of Teaching and Learning

Research Brief

Preliminary Validation of the Motor Skills Rating Scale[1]

Claire E. Cameron, Wei-Bing Chen, Julia Blodgett, Elizabeth Cottone, Andrew J. Mashburn, Laura L. Brock, and David Grissmer

This study developed the Motor Skills Rating Scale (MSRS), a brief questionnaire for early elementary teachers about children's motor skills. Three subscales – Shapes and Letters, Classroom Fine Motor, and Body Awareness – were positively associated with children's cognitive processes and mathematics achievement. Children with higher ratings on the Classroom Fine Motor subscale had higher levels of mathematics achievement.

Young children need a range of skills to succeed in a classroom setting. One skill set consists of motor behaviors, namely the ability to respond to classroom requirements with coordinated movements. Examples include taking out a pencil to write, packing a backpack, tying shoes, and walking in line. The motor sequences involved in these simple tasks are surprisingly complex.

Adults may overlook the importance of motor skills because we long ago mastered everyday tasks like tying our shoes. The motor-related aspects of children's success in classrooms are often overlooked in research as well. This is despite observational studies showing that motor requirements, especially fine motor requirements, abound in early childhood classrooms. And children who have strong fine motor skills early in kindergarten achieve at higher levels at the end of the school year, and later in elementary school. The link between early fine motor skills and later achievement seems especially strong for mathematics.

The goal of the present study, by researchers at the University of Virginia's Center for Advanced Study for Teaching and Learning (CASTL) and the School of Education at the College of Charleston, was to develop a teacher questionnaire of children's motor competence in the classroom, with a focus on fine motor skill.

Fine Motor Skills

Include at least three underlying cognitive processes:

(1) Visuospatial processing, which children use to recognize and manipulate objects in real or imagined space;

(2) Executive function (EF), which is used to attend to a task, monitor, and plan motor actions; and

(3) Sensorimotor processing, which includes the precision movements themselves.

A common way to assess these skills is with neuropsychological tests given to individual children, usually for diagnosing clinical problems. These are often costly and include multiple subtests that take time to train, administer, and score. Thus, a measure of typical children's motor skills that teachers can use in regular classrooms is needed.

The Study

The goal of this study was to develop a questionnaire for teachers that (a) reflects children's motor behaviors relevant to the regular classroom setting; (b) shows expected differences by age, gender, and

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This published study can be purchased at: http://jpa.sagepub.com/content/30/6/555

The Motor Skills Rating Scale (MSRS)

The MSRS questionnaire asks teachers to think about each child and to "Decide how frequently the statement applies to him or her" with responses ranging from "never" to "almost always." An "I have not observed" option was also provided.

Sample items from the MSRS include:

- Appears clumsy when building with materials.
- Holds a pencil awkwardly.
- Has trouble copying shapes and letters.
- Presses down on paper excessively when writing.
- Has difficulty staying seated in chair.
- When asked to write, fills up the page easily.
- Takes a long time to find or put things in backpack
- Is good at cutting with scissors.

The MSRS questionnaire was developed with the help of licensed occupational therapists.

*Please contact the first author to request the entire MSRS.

socioeconomic status (SES); (c) correlates with established, direct measures of the cognitive processes that underlie motor skill; and (d) predicts mathematics achievement.

Participants included 242 kindergarten, first, and second grade students from two sites in the middle- and south-east United States. Teachers completed questionnaires on children's classroom motor and academic skills. Children's cognitive and math skills were also assessed directly.

Children's cognitive processes were tested using seven subtests from the visuospatial, executive function, and sensorimotor domains of the NEPSY. Mathematics achievement was assessed using the Academic Rating Scale (ARS) and the KeyMath 3.

Findings

Results indicated teachers' perceptions of children's motor skills align with three distinct factors: Shapes and Letters, Classroom Fine Motor, and Body Awareness.

As studies of fine motor skills have shown, older children, girls, and those with higher SES scored at higher levels on the MSRS than boys, younger children, and children with lower SES.

Children's scores on the three MSRS subscales also correlated with measures of visuospatial processing, sensorimotor functioning, and EF. The strongest association emerged between the Classroom Fine Motor subscale and a measure of children's ability to copy designs with a paper and pencil.

Findings also indicated that each subscale independently predicted teachers' ratings of children's mathematics achievement. The Classroom Fine Motor subscale predicted achievement on the direct KeyMath measure. This last result is important because it shows that teachers' observations of children's fine motor skills are associated with how they score on an achievement test measured directly.

Practical Implications

Whereas research has focused on the conceptual skills that children need to learn mathematics (e.g., number sense) and how teachers teach and talk about mathematics, relatively little attention has been paid to another important way that young students learn about numbers, quantity, and spatial relationships. Especially in early grades, children learn mathematics by *using their hands in coordinated, thoughtful movement*.

To learn math in the classroom, children are asked to cut materials and arrange manipulatives, draw to represent quantities and spatial relationships, and write numbers on a page. Children whose teachers gave them high ratings on the Classroom Fine Motor subscale may have already developed an automaticity when thinking while working with their hands with pencil, paper, and other materials; which may in turn have emerged in their mathematics achievement.

If research bears out the educational relevance of the skills assessed by the Classroom Fine Motor subscale, these findings draw attention to fine motor functioning at a time when schools focus increasingly on conceptual academic skills. A growing number of studies, including the present inquiry, suggest that underemphasized areas of competence, including children's fine motor skills, are nonetheless important for later achievement.

The MSRS is economical and easy to administer and score, which, unlike a longer battery, makes it possible for teachers to complete for their entire classroom. Future work must establish the reliability and validity of the MSRS in other samples.

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