

Attentional Control and Visuomotor Integration Uniquely Contribute to Children's Successful Classroom Functioning

Helyn Kim, Anthony I. Byers, Claire E. Cameron, Laura L. Brock, Elizabeth A. Cottone, & David W. Grissmer

This study examined how two cognitive skills, attentional control and visuomotor integration, related to how kindergarten and first graders function in the classroom, as perceived by their teachers. Specifically, children with better attentional control and visuomotor integration earned higher teacher ratings of classroom self-regulation, but cognitive skills were not related to problem behaviors.

Young children who enter school make many transitions. They experience new structures and unfamiliar rules, and many children struggle initially to adapt to the classroom. Those who make the transition successfully do so across multiple realms of development, including cognitive, behavioral and academic achievement. In recent years, two cognitive skills have been identified as critical foundations for this development: attentional control and visuomotor integration (*see Sidebars 1 and 2 for examples*). Attention underlies whether children are able to cognitively engage in classroom tasks, and to avoid distractions and competing behaviors like conflicts with peers and teachers. Visuomotor integration is also relevant for learning, given the prevalence of activities requiring children to understand visual information and manipulate objects using their fine motor skills.

Sidebar 1: Attentional Control

Examples from the classroom may include:

- Working independently
- Ignoring distractions
- Following classroom rules and teacher directions
- Engaging in and persisting with classroom activities
- Shifting efficiently from one activity to another

Furthermore, in elementary school, children need to simultaneously perform multiple tasks that rely on their attentional control and visuomotor integration skills. For instance, children need to attend to multiple teacher directions, while working with several kinds

of learning materials, such as writing tools and manipulatives. Still, while research has established the importance of visuomotor integration for academic achievement, less is known about how visuomotor integration relates to general classroom functioning.

Classroom functioning is defined in this study as teachers' perceptions of children's self-regulation and problem behaviors. The link between attention and both components of classroom functioning is intuitive and well established in the literature; children with strong attentional control are more adept at following classroom rules, being engaged in lessons, and maintaining self-control in the classroom. Similarly, children with the ability to shift attention, resist distractions and control impulsive behavior demonstrate fewer problem behaviors. Visuomotor integration may also be important for helping children to regulate their behaviors in the classroom and cope with the complex learning environment, thereby leading to more effective learning behaviors (i.e. focus, engagement, attention).

The Study

The goal of this study was to explore the association between two cognitive skills (attentional control and visuomotor integration), and teacher perceptions of children's classroom functioning (self-regulation and problem behaviors). Participants included 287 kindergarten and first grade students from two sites in the mid-Atlantic and southeastern United States. The sample included 75% African American and 20% Caucasian children, and 73% of families qualified for free or reduced lunch. The sample average age was 6.3 years.

Children's attentional control and visuomotor integration were directly tested at the beginning of the school year using two reliable subtests from the NEuroPSYchological assessment (NEPSY, Korkman, Kirk, & Kemp, 1998¹). Teachers reported on children's self-regulation and problem behaviors using the

Child Behavior Rating Scale (CBRS: Bronson, Tivnan, & Seppanen, 1995²) and the Social Skills Improvement System (SSIS: Gresham & Elliot, 2008³), respectively.

Sidebar 2: Visuomotor Integration

Examples from the classroom may include:

- Copying from the Smartboard
- Tracing shapes, pattern, letters, and numbers
- Manipulating blocks and other tangible learning tools
- Packing up a lunchbox

Findings

Overall, findings indicate that children's self-regulation, as perceived by their teachers, has multiple cognitive foundations. Specifically, we found that teachers gave higher ratings of behavioral self-regulation to children who had strong attentional and visuomotor skills. Moreover, teachers saw children with strong visuomotor integration as better able to navigate the demands of the classroom more effectively, even beyond their ability to control their attention.

Growing evidence suggests that attentional control and visuomotor integration compete for a limited amount of cognitive resources when completing a task. Therefore, children who are able to automatically or more easily perform visuomotor integration tasks may free up their cognitive resources that can then be used to exhibit adaptive self-regulatory behaviors, as well as to inhibit inappropriate behaviors. Contrary to our hypothesis, we were somewhat surprised to find that neither cognitive skills predicted teacher rated problem behaviors in the classroom. In our study, there were low incidences of teacher reported problem behaviors, which may have contributed to this lack of significant associations.

Future studies should explore other potential child factors that are linked to teacher perceptions of children's problem behaviors.

Practical Significance

Given that a successful transition depends on multiple cognitive processes and skills that work together, educators and researchers who are interested in supporting children during this transition should consider simultaneously targeting multiple skills. Our study indicates that visuomotor integra-

tion may be an additional cognitive foundation that should be formally supported, to more effectively improve children's self-regulation in the classroom.

Footnotes:

¹ Korkman, M., Kirk, U., & Kemp, S. (1998). *NEPSY: A developmental neuropsychological assessment*. San Antonio, TX: Psychological Corp.

² Bronson, M. B., Tivnan, T., & Seppanen, P. S. (1995). Relations between teacher and classroom activity variables and the classroom behaviors of prekindergarten children in chapter 1 funded programs. *Journal of Applied Developmental Psychology, 16*(2), 253–282.

³ Gresham, F. M., & Elliott, S. N. (2008). *Social skills improvement system rating scales manual*. Minneapolis, MN: NCS Pearson.

Corresponding author:

Helyn Kim (hk3a@virginia.edu)

Acknowledgements:

This study was funded by the Department of Health and Human Services (HHS) American Recovery and Reinvestment Act (ARRA) under award number 1RC1HD063534-01, the National Science Foundation under award numbers DRL-0815787 and REAL-1252463, and by the Institute of Education Sciences, U.S. Department of Education, through Grant #R305B090002 to the University of Virginia. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.