Reading Disabilities: Examining Related Skill Areas

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Topics

• Attention and ADHD
• Math and dyscalculia

ADHD

A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development.

DSM-5 Definition
Meta analyses of whole brain fMRI studies in ADHD

Rates of ADHD/RD Comorbidity

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ADHD and EF

- Do individuals with ADHD also show EF deficits?
  - Not consistently
  - Working memory, response inhibition, vigilance, and planning (Willcutt et al., 2005)
  - But up to 50% do not demonstrate EF issues (Biederman et al., 2004, 2006; Nigg et al., 2005)

Approaches to EF improvement

- Train, use, challenge, expand EF skills directly
- Minimize EF demands that accompany tasks
- Reduce factors that can tax EF peripherally (e.g., stress)

Approaches to EF improvement

- Formal training programs
  - Issue in far transfer when near transfer is available
- Meditation
- Complex physical activity
- Whole child approach
Recent work from Diamond’s group


- Diamond, A. & Ling, D. (forthcoming) “Fundamental Questions Surrounding Efforts to Improve Executive Functions” The first review to look at all the different methods (e.g., cog. training, phys. exercise, etc.) and at all ages (children thru elderly), in an Oxford UP book edited by Bunting et al. An Integrative Approach to Cognitive & Working Memory Training

Dyslexia Plus ADHD

Dyscalculia

Difficulties characterized by problems processing numerical information, learning arithmetic facts, and performing accurate or fluency calculations.

*DSM-5 Definition*
Cortical Networks for Math:
- Auditory/Verbal
- Visual/Symbolic
- Quantitative

Math Disability: Brain Signature

Math & Language: how can they be related?

**Only in math problems can you buy 50 cantaloupes and no one asks what the hell is wrong with you.**
Language Difficulties
A student with language problems in math may
• have difficulty with the vocabulary of math
• be confused by language in word problems
• not know when irrelevant information is included or when information is given out of sequence
• have trouble learning or recalling abstract terms
• have difficulty understanding directions
• have difficulty explaining and communicating about math, including asking and answering questions
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Output Difficulties
A student with problems in output may be unable to
• recall basic math facts, procedures, rules, or formulas
• be very slow to retrieve facts or pursue procedures
• have difficulties maintaining precision during mathematical work
• have difficulties with handwriting that slow down written work or make it hard to read later
• have difficulty remembering previously encountered patterns
• forget what he or she is doing in the middle of a math problem

Organizational Difficulties
A student with problems in organization may
• have difficulties sequencing multiple steps
• become entangled in multiple steps or elements of a problem
• lose appreciation of the final goal and over emphasize individual elements of a problem
• not be able to identify salient aspects of a mathematical situation, particularly in word problems or other problem solving situations where some information is not relevant
• be unable to appreciate the appropriateness or reasonableness of solutions generated
Attention Difficulties

A student with attention problems in math may

• be distracted or fidgety during math tasks
• lose his or her place while working on a math problem
• appear mentally fatigued or overly tired when doing math

Visual Spatial or Ordering Difficulties

A student with problems in visual, spatial, or sequential aspects of mathematics may

• be confused when learning multi-step procedures
• have trouble ordering the steps used to solve a problem
• feel overloaded when faced with a worksheet full of math exercises
• not be able to copy problems correctly
• may have difficulties reading the hands on an analog clock
• may have difficulties interpreting and manipulating geometric configurations
• may have difficulties appreciating changes in objects as they are moved in space

Difficulties with multiple tasks

A student with problems managing and/or merging different tasks in math may

• find it difficult to switch between multiple demands in a complex math problem
• find it difficult to tell when tasks can be grouped or merged and when they must be separated in a multi-step math problem
• cannot manage all the demands of a complex problem, such as a word problem, even though he or she may know component facts and procedures
Cut-off scores and criteria for difficulties can vary

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Implications for educators and clinicians

- Findings have significant implications for educators and clinicians who work with children who have RD, MD, or ADHD:
  - Many children with RD may be struggling with difficulties in both math and attention, but these comorbid challenges are notably under-recognized.
  - Future investigations should consider how differentiated interventions can support children with co-occurring difficulties with RD, MD, and ADHD.