Progress Monitoring and Data Based Decision Making in the Context of RTI

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RTI: Three Tiers

- **Tier 1**
  - General education
    - Research-based program
    - Faithfully implemented
    - Works for vast majority of students
    - Screening for at-risk pupils, with weekly monitoring of at-risk response to general education

- **Tier 2**
  - Small-group preventative tutoring
  - Weekly monitoring of at-risk response to tier 2 intervention

- **Tier 3**
  - Multi-disciplinary team evaluation for possible disability certification and special education placement.
Primary Prevention:
School-/Classroom-Wide Systems for All Students, Staff, & Settings

Secondary Prevention:
Specialized Group Systems for Students with At-Risk Behavior

Tertiary Prevention:
Specialized Individualized Systems for Students with Intensive Needs

CONTINUUM OF SCHOOL-WIDE SUPPORT

~80% of Students

~15%

~5%
RTI: Screening in Tier 1

- Children are assessed to specify who enters the RTI process.

- RTI success depends on accurate specification of this risk pool.

- Perfect screening would result in 100% accurate identification of “True Positives” (those who will develop RD) who will go into Tier 2 interventions and “True Negatives” (those who will not develop RD) who will be excluded from Tier 2 intervention.
Two Types of Screening Errors

- Two types of errors challenge the accuracy of procedures for determining risk.
  - False positives
    - Children who eventually become good readers score below the screening cut score and are falsely identified as at risk.
    - Undermine RTI’s prevention purpose by increasing the number of children identified at risk and thereby stressing school resources to provide intervention to an inflated percentage of the population.
  - False negatives
    - Children who later exhibit reading problems score above the cut score and are falsely identified as not at risk.
    - Diminish the utility of RTI prevention by failing to provide intervention to children who will eventually develop RD.
Identifying Children Who Are Responders (not at risk for LD) and Nonresponders (at risk for LD) to Tier 1 Instruction:

Hypothetical Case Studies
Sarah’s Progress on Words Read Correctly

Sarah Smith
Reading 2

Words Read Correctly

Sep  |  Oct  |  Nov  |  Dec  |  Jan  |  Feb  |  Mar  |  Apr  |  May  

0     |      |      |      |      |      |      |      |      

20    |      |      |      |      |      |      |      |      

40    |      |      |      |      |      |      |      |      

60    |      |      |      |      |      |      |      |      

80    |      |      |      |      |      |      |      |      

100   |      |      |      |      |      |      |      |      

120   |      |      |      |      |      |      |      |      

140   |      |      |      |      |      |      |      |      

160   |      |      |      |      |      |      |      |      

180   |      |      |      |      |      |      |      |      

Sarah Smith

Reading 2
Jessica’s Progress on Words Read Correctly

![Graph showing Jessica Jones' reading progress from September to May. The x-axis represents the months of the year, and the y-axis represents the number of words read correctly. The graph shows a relatively flat line, indicating consistent reading progress.](image-url)
Decision Point 1: Can we accurately identify children who are at-risk for becoming RD? (i.e., Sarah vs. Jessica)
NRCLD Study Purpose

- Explore issues affecting development of decision rules for selecting 1st graders for Tier 2 intervention within an RTI model of LD identification.

- Research questions:
  - What is the added predictive utility of including initial word identification fluency (WIF) or 5 weeks of WIF PM to a multivariate screening battery (that already includes phonemic awareness, rapid naming skill, and oral vocabulary)?
  - Are there advantages to using classification tree analysis over logistic regression in developing statistical prediction rules?
Overview of Study Methods

- 252 identified low study entry 1st graders.
- In October, administered a multivariate prediction battery: initial WIF, phonemic awareness, rapid naming, oral vocabulary.
- Monitored progress with WIF, each week for 5 weeks; calculated 5-week slope and level.
- At end of grade 2, administered standardized reading battery: untimed and timed measures of word identification and word attack and reading comprehension. Used the composite score across these measures to classify children as RD/non-RD.
CBM used to monitor the development of overall reading skill from beginning to end of 1st grade.

In previous work, strong predictive validity for initial WIF and for year-long WIF slopes with respect to end-of-year decoding, word recognition, reading fluency, and reading comprehension performance.
## List 1

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<th>of</th>
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## Results

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<th>Sens</th>
<th>Spec</th>
<th>AUC</th>
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<tr>
<td><strong>Initial Screen</strong></td>
<td>145/5/15/41</td>
<td>77.7</td>
<td>75.0</td>
<td>80.0</td>
<td>.863</td>
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<td>Sound Matching</td>
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<tr>
<td>Rapid Digits</td>
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<td></td>
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<td></td>
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<tr>
<td>Vocabulary</td>
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<tr>
<td><strong>Add Initial WIF</strong></td>
<td>150/3/17/36</td>
<td>81.1</td>
<td>85.0</td>
<td>80.6</td>
<td>.904</td>
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<tr>
<td><strong>Add 5-Week PM</strong></td>
<td>154/2/18/32</td>
<td>83.4</td>
<td>90.0</td>
<td>82.7</td>
<td>.912</td>
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<td><strong>Classification</strong></td>
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<tr>
<td><strong>Tree Analysis</strong></td>
<td>174/0/20/12</td>
<td>96.8</td>
<td>100.0</td>
<td>93.5</td>
<td>.982</td>
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Implications for Tier 1 Screening

- Results suggest that the potential exists to develop decision rules that allow identification of the “right” children to enter Tier 2 early in 1st grade.
- Additional work is needed to replicate and extend findings.
- *Schools planning to implement an RTI approach to LD identification should put considerable thought into designing an effective system for designating a risk pool that enters Tier 2 intervention that maximizes true positives and minimizes false negatives.*
- For complete information on study see:
RTI Tier 2: Standardized Research-Based Preventative Treatment

Tutoring

- Small groups (2-4)
- 3-4 sessions per week (30-45 min per session)
- Conducted by trained and supervised personnel (not the classroom teacher)
- In or out of classroom
- 10-20 weeks
What does Tier 2 look like?

Hypothetical Case Studies
Case B

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Student Does Not Have a Disability

**Step 1: Screening**
- Is this student at risk?
  - Word Identification Fluency = 10.5
  - Yes → **Step 2**
  - No → **Step 3**

**Step 2: Assessing Tier 1 Response**
- Is this student responsive to general education?
  - Word Identification Fluency Slope = 1.8
  - Yes → **Step 3**
  - No → **Step 4**

**Step 3: Assessing Tier 2 Response**
- Is this student responsive to diagnostic instructional trial?
  - Word Identification Fluency = NA
  - Yes → **Step 4**
  - No → **Step 5**

**Step 4: Disability Classification/ Special Education Placement**
- What is the student's disability label?
  - LD → MR → EBD
Case C

Student Does Not Have a Disability

Step 1: Screening
Is this student at risk?
Word Identification Fluency = 10.5
No → Yes

Step 2: Assessing Tier 1 Response
Is this student responsive to general education?
Word Identification Fluency Slope = 1.8
Yes → No

Step 3: Assessing Tier 2 Response
Is this student responsive to diagnostic instructional trial?
Word Identification Fluency = NA
Yes → No

Step 4: Disability Classification/
Special Education Placement
What is the student's disability label?
LD → MR → EBD
Case D

Student Does Not Have a Disability

Step 1: Screening
Is this student at risk?
Word Identification Fluency = 10.5

No
Yes

Step 2: Assessing Tier 1 Response
Is this student responsive to general education?
Word Identification Fluency Slope = 1.8

Yes
No

Step 3: Assessing Tier 2 Response
Is this student responsive to diagnostic instructional trial?
Word Identification Fluency = NA

Yes
No

Step 4: Disability Classification/Special Education Placement
What is the student’s disability label?
LD
MR
EBD
Decision Point 2

Can characteristic growth patterns of children who are either LD and not LD be identified from Tier 2 instruction?
Instructional Groups and Outcome Measures

- Randomly to *Fall Tutoring* (n = 84); *Spring Tutoring—Maybe* (n = 84); and *No Tutoring Control* (n = 84). Total N = 252.
- PM on WIF for 18 weeks of 1st grade
- Outcome assessment in April of 3rd grade
  - Untimed decoding (WRMT Word Attack)
  - Untimed word identification (WRMT WID)
  - Reading comprehension (WRMT Passage Comprehension)
- A variable for RD at the end of 3rd grade was created based on performance below a standard score of 85 on the WRMT measures. Complete records for 180 children.
Evidence-Based Tutoring

- Tutoring
  - Letter-Sound Recognition
  - Phonological awareness and decoding
  - Sight Words
  - Fluency
- Four Groups
  - Fall Tutoring (n=61)
  - Spring Tutoring for Nonresponsive Children (n=32)
  - Spring No Tutoring for Responsive Children (n=32)
  - Controls (No Tutoring, n=55)
- Sessions
  - Conducted by research assistants
  - 2-4 students per group
  - 4 sessions/week
  - 45 minutes/session
  - For a total of 36 sessions of tutoring
Growth Mixture Model

Curriculum Based Measure
- Reading: WIF
- Math: COMP

Categorical Outcomes
- Reading: WID, WA, PC
- Math: CALC, SP

CBM1 \rightarrow CBM2 \rightarrow CBM3 \rightarrow \ldots \rightarrow CBM_i

Intercept \rightarrow I \rightarrow S \rightarrow Q \rightarrow C \rightarrow F

Covariates
- Reading: SM, VOC, RDN
- Math: LANG, SM, MR, CO, WM, INATT

Known Classes
Reading:
- Fall tutoring
- Spring tutoring necessary
- Spring tutoring not necessary
- Control
Math:
- Average
- Control
- Tutoring

Unobserved Subpopulations
Reading: RD & NRD
Math: MD & NMD

Follow-up Testing
- Reading: Third Grade
- Math: Second Grade

First Grade
Growth Patterns Associated with LD
# LD Rates by Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Within Group LD Rate (percentage)</th>
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<tbody>
<tr>
<td>Fall Tutoring</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>8/61</td>
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<tr>
<td>Spring Tutoring Yes</td>
<td>38%</td>
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<tr>
<td></td>
<td>12/32</td>
</tr>
<tr>
<td>Spring Tutoring No</td>
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<td></td>
<td>0/32</td>
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<tr>
<td>Control</td>
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<td></td>
<td>11/55</td>
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Can characteristic growth patterns of children who are either LD and not LD be identified for Tier 2 instruction?

- Characteristic LD and nonLD growth curves were identified for first graders using the progress monitoring measures.
- The percentage of children identified as LD varied as a function of group in a predictable fashion.
- There is reason to be optimistic that response to Tier 1 and Tier 2 instruction can accurately identify children unresponsive to quality instruction.
Thank You