The Effectiveness of Emergent Literacy Intervention for Pre-kindergarteners At Risk for Reading Failure: A Longitudinal Growth Curve Analyses

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Nemours BrightStart!

Background

- Preschool reading readiness is an issue with growing interest
- Early intervention is promising method for diminishing reading achievement gap for children at-risk for reading delays
- Very little research has focused specifically on emergent literacy intervention with preschoolers
- Our intervention program successful in closing reading achievement gap, but longitudinal investigation needed

Objective

- The aim of this study is to demonstrate that gains in emergent literacy skills are maintained beyond the completion of a targeted multisensory preschool emergent literacy intervention into early elementary years

Early Literacy Intervention

- Children identified as “at-risk” for reading failure based on screening measure received a targeted multisensory intervention
- 18 week intervention; 30 minute lessons provided over 9 weeks
- Tier Two curriculum delivered by highly skilled and experienced teachers; groups consisted of 2 to 4 children
- Focus on letter names and sounds, syllable counting and segmentation, rhyming, alliteration, and on-set-rime
- Post test results indicate intervention children performed at same as non-intervention children who did not qualify

Methods

Study Design:

- Preschool and child care sites included as part of large scale early literacy initiative; sites selected and matched according to zip code
- Prospectively enrolled sample (N = 200) who received early literacy intervention and non-intervention children who did not qualify in prek
- Participants’ kindergarten through second grade state standardized reading achievement scores collected in Fall, Winter, and Spring each year

Participants:

- 107 boys and 88 girls in sample (gender not recorded for 5 children)
- 36 intervention children and 164 non-intervention children
- 50% African American, 40% Caucasian, 4% Hispanic, 2% Asian, 4% other
- 34% Low SES and 66% mid to high SES

Measures:

- Get Ready to Read (GRR) Screening Tool (Whitehurst & Lonigan, 2001)
- Administered in pre-k before and after intervention
- Reading Achievement Skills
  - Dynamic Indicators of Basic Early Literacy Skills (DIBELS): Spring Assessments
  - Letter Name Fluency (LNF), Oral Reading Fluency (ORF), and Nonsense Word Fluency (NWF)
- Socioeconomic Status (SES)
  - Enrolled in free and reduced lunch program at school

Results

Relationships Among Predictor and Outcome Variables

- Fixed effects: intervention group did not predict initial level but did predict slope
- Random effects: Individual differences remain in initial level and slope
- Covariates resulted in poor model fit so most parsimonious model selected; none related to intervention group status
- No relationship between initial level and slope

Figure 1. Latent Growth Model of Oral Reading Fluency Skills

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>ORF Level</th>
<th>ORF Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LNF (Kindg)</td>
<td>ORF (1st Grade)</td>
</tr>
<tr>
<td>Intervention Group</td>
<td>0.39</td>
<td></td>
</tr>
</tbody>
</table>

Relationships Among Predictor and Outcome Variables

- Fixed effects: Intervention group did not predict initial level or slope
- Random effects: Individual differences remain in initial level, none for slope
- Boys improved at a faster rate than girls over the years
- No relationship between initial level and slope

Figure 2. Latent Growth Model of Nonsense Word Fluency Skills

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>NWF Level</th>
<th>NWF Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NWF (Kindg)</td>
<td>NWF (1st Grade)</td>
</tr>
<tr>
<td>Intervention Group</td>
<td>0.39</td>
<td></td>
</tr>
</tbody>
</table>

Analysis

Univariate Conditional Latent Growth Curve Models:

- Model fit using full information maximum likelihood (FIML)
- Data fit using linear growth curve with equal time spacing at three time points (Kindergarten, First Grade, and Second Grade). Homogeneity of variance assumption held
- Measures were 2 scored to allow for comparison across subtests
- ORF comprised of LNF-kindg, ORF-first and second grade Spring assessments
- NWF comprised of NWF in kindg, first, and second grade Spring assessments
- Time-Invariant (Predictor) Variables
  - Intervention Group (received early literacy pre-k intervention vs. children who did not qualify in pre-k), gender, ethnicity, SES, grade retention
- Time-Variant (Outcome) Variables
  - Reading Achievement: Oral Reading Fluency and Nonsense Word Fluency
- Fit indices (Table 1) indicate that both models fit the underlying structure of the data well

Table 1. Fit Indices

<table>
<thead>
<tr>
<th>Latent Growth Curve Model</th>
<th>X^2</th>
<th>P value</th>
<th>NFI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PClose</th>
<th>Hoelter</th>
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</thead>
<tbody>
<tr>
<td>Oral Reading Fluency</td>
<td>4.302</td>
<td>.231</td>
<td>.972</td>
<td>.991</td>
<td>.047</td>
<td>.423</td>
<td>.525</td>
</tr>
<tr>
<td>Nonsense Word Fluency</td>
<td>6.18</td>
<td>.403</td>
<td>.942</td>
<td>.998</td>
<td>.012</td>
<td>.677</td>
<td>.542</td>
</tr>
</tbody>
</table>

Notes. ORF = Oral Reading Fluency; LNF = Letter Name Fluency; NWF = Nonsense Word Fluency; red solid line = significant regression coefficient; dashed line=non-significant regression coefficient; black solid line=fixed value

Conclusions

- Findings contribute to previous work confirming sustained literacy gains three years after participation in a targeted multisensory early literacy intervention program
- Intervention children scored at or above their grade level in the years following intervention thus indicating the long term success of intervention methodology
- LGC models indicate that intervention group status was not a significant predictor of beginning reading skill levels reading in kindergarten
- The rate of growth of reading skills varied between reading measures; Non-intervention children improved in ORF slightly faster than intervention children whereas the slope of NWF was non significant
- The finding that beginning reading level was not related to rate of change in reading skill should be interpreted with caution given lack of power resulting from small N
- Significant individual differences remain in beginning reading levels and rate of change for ORF; suggests influence of child & family factors to be examined in future
- Results are preliminary based on first cohort of large scale study; subsequent cohorts followed in three consecutive years with much larger N, will be examined next

Current Study Implications

- Targeted multisensory intervention changed reading trajectories for preschoolers at risk for reading delays; findings offer hope that early literacy interventions may ameliorate the risk of reading delays in struggling readers
- Results make a significant contribution to the field of reading disability research by demonstrating the long term positive impacts of emergent literacy intervention with preschoolers at risk for reading delays

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Figure 1. Latent Growth Model of Oral Reading Fluency Skills

Figure 2. Latent Growth Model of Nonsense Word Fluency Skills