Testing causal impacts of a school-based SEL intervention using Instrumental Variables techniques

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Objective

- Examine the mechanisms explaining changes in classroom climate after two years of RULER, a universal school-based social and emotional learning approach
A growing body of research links supportive classroom climates and social and emotional skills to students’ positive academic and social outcomes (e.g., Jones et al., 2011).

Mounting evidence has spurred the design of school-based programs aimed at improving the quality of classroom climates and students’ social and emotional skills (Durlak et al., 2011).

Program evaluations typically test direct impacts on child outcomes, but intervening mechanisms remain largely unexplored.
RULER’s Theory of Change

Intervention Components
- Conceptual Framework of Anchor Tools & Feeling Words Curriculum
  - Training for leaders, teachers, and staff
  - Coaching support for teachers
  - RULER Materials

RULER Implementation
- School-wide & Classroom Use of Anchors:
  - Charter
  - Mood Meter
  - Meta-Moment Blueprint
- Classroom Enactment of the Feeling Words Curriculum

Proximal Outcomes
- Improved Emotional Climate in Classrooms
- Improved Student SEL Skills

Distal Outcomes
- Improved classroom organization and instruction
- Improved teacher wellbeing
- Improved student relationships, academic engagement, and achievement
- Fewer disruptive behaviors

Yale Center for Emotional Intelligence
Research Question

Do impacts on classroom emotional climate after 1 year of RULER causally mediate impacts on classroom organization and instructional support after 2 years?
Measures

Classroom Observation Scoring System (CLASS, Pianta & Hamre, 2009)

DOMAINS

Emotional Supports
- Positive climate
- Negative climate
- Sensitivity
- Respect for student perspective

Classroom Organization
- Behavior management
- Productivity
- Instructional learning formats

Instructional Supports
- Concept development
- Quality of feedback
- Language modeling

DIMENSIONS

INDICATORS

Emotional Supports
- Relationships, Affect, Communication
- Puniteness, Sarcasm, disrespect, Negativity
- Awareness, Responsiveness, Action to address problems, Comfort
- Flexibility, Autonomy, Student expression

Classroom Organization
- Clear expectations, Proactivity, Redirection
- Maximized time use, Efficient routines and transitions
- Variety, Promotion of student interests, Clarity, Engaging approach

Instructional Supports
- Analysis, reasoning, Creativity, integration
- Feedback loops, Encouragement of responses, Expansion of performance
- Conversation, Open-endedness, Repetition, Advanced language

Participant Flow Chart

Enrollment

Allocation & Pretest

Posttest Analytic Sample

66 schools

Control
31 schools; 94%

11 schools; 36%
Classrooms (5-6 grades)
Baseline: 34
Spring Y1: 25
Spring Y2: 41

RULER
31 schools; 94%

12 schools; 39%
Classrooms (5-6 grades)
Baseline: 34
Spring Y1: 24
Spring Y2: 47

Note: School percentages reported at each stage calculated based on number of participants at prior stage. Classroom-level scores aggregated to the school level to test relationships across three academic years.
## Sample Characteristics at Baseline

<table>
<thead>
<tr>
<th>VARIABLE (n=23)</th>
<th>Control M (SD)</th>
<th>RULER M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>School size</td>
<td>331 (108.1)</td>
<td>280 (65.5) *</td>
</tr>
<tr>
<td>% minority students</td>
<td>70.7 (36.3)</td>
<td>71.54 (29.2)</td>
</tr>
<tr>
<td>% students receiving free/reduced price lunch</td>
<td>29.2 (30.7)</td>
<td>28.47 (37.6)</td>
</tr>
<tr>
<td>Presence of other SEL program</td>
<td>54.5%</td>
<td>58.3%</td>
</tr>
<tr>
<td>Emotional support</td>
<td>4.78 (.41)</td>
<td>5.00 (.34)</td>
</tr>
<tr>
<td>Classroom organization</td>
<td>5.71 (.28)</td>
<td>5.34 (.71)</td>
</tr>
<tr>
<td>Instructional support</td>
<td>3.09 (.49)</td>
<td>3.02 (.59)</td>
</tr>
</tbody>
</table>

Note: *Difference between control and RULER schools was statistically significant at p < .05*
## Zero-order Correlations (n=23)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Year 1 Spring</th>
<th>Year 2 Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CO</td>
<td>IS</td>
<td>ES</td>
</tr>
<tr>
<td>Emotional Support (ES)</td>
<td>.482*</td>
<td>.702**</td>
<td>.322</td>
</tr>
<tr>
<td>Classroom Organization (CO)</td>
<td>1</td>
<td>.656**</td>
<td>.302</td>
</tr>
<tr>
<td>Instructional support (IS)</td>
<td>1</td>
<td>.341</td>
<td>.446*</td>
</tr>
<tr>
<td>Emotional Support (ES)</td>
<td></td>
<td>1</td>
<td>.616**</td>
</tr>
<tr>
<td>Classroom Organization (CO)</td>
<td>1</td>
<td></td>
<td>.643**</td>
</tr>
<tr>
<td>Instructional support (IS)</td>
<td>1</td>
<td></td>
<td>.452*</td>
</tr>
<tr>
<td>Emotional support (ES)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classroom Organization (CO)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *Significant at p < .05; **Significant at p < .01
**Instrumental Variables Analysis**

- **Instrument:** Random assignment of schools to treatment conditions
- **2-stage least square**\(^*\) and LIML estimates
- Classrooms were not followed over time. To examine relationships across 3 academic years classroom scores aggregated within each school
- **Covariates:** school size, baseline school-level classroom organization and instructional support

Note: \(^*\) 2-stage least square estimates reported
Results

First Stage Regressions for Classroom Organization

- RULER predicts significant changes in emotional support after 1 year.
- $F$ statistic was statistically significant but did not exceed the critical value of 10 (Stock, Wright, & Yogo, 2002)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Estimate</th>
<th>SE</th>
<th>95% CI</th>
<th>$F$ Statistic for Instrument</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional support</td>
<td>.359*</td>
<td>.126</td>
<td>.094 - .623</td>
<td>3.74</td>
<td>.27</td>
</tr>
</tbody>
</table>

Note: * Statistically significant at p < .05)
Results

First Stage Regressions for Instructional Support

- $F$ statistic was marginally significant and did not exceed the critical value of 10 (Stock, Wright, & Yogo, 2002)

<table>
<thead>
<tr>
<th>Independent Variable = Treatment</th>
<th>Outcome</th>
<th>Estimate</th>
<th>SE</th>
<th>95% CI</th>
<th>$F$ Statistic for Instrument</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emotional support</td>
<td>.354*</td>
<td>.134</td>
<td>.072 - .635</td>
<td>2.66</td>
<td>.23</td>
</tr>
</tbody>
</table>

Note: * Statistically significant at p < .05
Results

Second Stage Regressions

Changes in emotional support after 1 year of RULER mediate 2-year impacts on classroom organization and instructional support

<table>
<thead>
<tr>
<th>Independent Variable = Emotional Support</th>
<th>Outcome</th>
<th>Estimate</th>
<th>SE</th>
<th>95% CI</th>
<th>R² full model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organization</td>
<td>.731*</td>
<td>.268</td>
<td>.204 – 1.26</td>
<td>.603</td>
</tr>
<tr>
<td></td>
<td>Instructional Support</td>
<td>.956*</td>
<td>.311</td>
<td>.346 – 1.566</td>
<td>.696</td>
</tr>
</tbody>
</table>

Note: * Statistically significant at at p < .05)
Limitations

• Missing data and small sample size
• Weak instrument
• Violation of exclusion restriction
• Change in classrooms modeled at the school level
Conclusions

• Instrumental variable analysis supports the theory of change of RULER and previous non-causal findings (Hagelskamp et al., 2013)
  
  • Over time, RULER leads to improvements in overall classroom climate
  
  • Changes in classrooms’ emotional support account for later changes in classroom’s organization and instructional support
  
• Emotional support plays a central role in enabling improvements in other classroom processes
Future Directions

• Replicating analyses with imputed data
• Testing mechanisms leading to change in student outcomes
Thank you!