The Impact of Prior Service Costs on Change in Externalizing Problems

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Purpose

- The current study examines whether children who had prior contacts with various child-serving sectors differed in terms of changes in their clinical outcomes over time.
- In addition, the study examines possible predictors of variation in individual rates of change in costs over time.

Research Questions

- First, do the costs of services change over time?
- If so, do costs vary as a function of whether the child receives services in a system of care vs. a comparison system?
- And are changes in costs over time systematically related to specific characteristics of the children being served (e.g., demographic characteristics, prior services, etc.)?

Research Questions continued

- Second, do the externalizing problems of children with serious emotional disturbance change over time?
- If so, do outcomes vary as a function of where the child receives services (through a CMHS-funded system of care or a non-funded comparison system)?
- And, are changes in child symptomatology over time systematically related to whether the child had prior contacts with varying child-serving sectors?

CMHS Initiative and National Evaluation

- The Center for Mental Health Services (CMHS) has funded 92 communities in 4 phases since 1993 to build systems of care (SOC) to serve children with serious emotional disturbance.
- National evaluation of 22 communities funded in Phase 1 included a comparison study of 3 pairs of communities.

Design of Phase I Longitudinal Comparison Study

- Each pair matched two mental health care systems:
  - Community funded to develop SOC
  - Matched comparison community with a more traditional mental health service delivery system
- Longitudinal follow-up:
  - Recruited children and youths with serious emotional disturbance
  - Interviewed child and caregiver at baseline and every 6 months for 2 years.
CMHS Phase I Comparison Study

- Stark County, OH (SOC) and Mahoning County, OH
- East Baltimore (SOC) and West Baltimore
- Santa Cruz County, CA (SOC) and Travis County, TX (Austin)
- Focus on Stark (Canton) and Mahoning (Youngstown) Counties because:
  - more children enrolled into study
  - better retention rates
  - only pair to include an extensive community-wide service utilization study component

Child Demographics for Sample

<table>
<thead>
<tr>
<th></th>
<th>Mahoning Non-SOC (N=209)</th>
<th>Stark SOC (N=217)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>11.5</td>
<td>11.2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>69.4%</td>
<td>65.9%</td>
</tr>
<tr>
<td>Female</td>
<td>30.6%</td>
<td>34.1%</td>
</tr>
<tr>
<td>Race***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-White</td>
<td>61.7%</td>
<td>29.0%</td>
</tr>
<tr>
<td>White</td>
<td>38.3%</td>
<td>71.0%</td>
</tr>
<tr>
<td>Poverty***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$15,000</td>
<td>68.9%</td>
<td>54.4%</td>
</tr>
<tr>
<td>$15,000 or more</td>
<td>31.1%</td>
<td>45.6%</td>
</tr>
</tbody>
</table>

Note: ***p<.005.

Costs Components

- Total costs consist of mental health costs and other sector costs
- Mental health costs include costs for services derived from primary mental health center MIS in each community
- Other sector costs include costs associated with services provided by
  - Juvenile justice
  - Child protective services
  - Special education

Prior Costs for Sample

<table>
<thead>
<tr>
<th></th>
<th>Mahoning Non-SOC (N=209)</th>
<th>Stark SOC (N=217)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Other Sector*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>29.2%</td>
<td>20.3%</td>
</tr>
<tr>
<td>No</td>
<td>70.8%</td>
<td>79.7%</td>
</tr>
<tr>
<td>Mental Health Only**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26.8%</td>
<td>39.6%</td>
</tr>
<tr>
<td>No</td>
<td>73.2%</td>
<td>60.4%</td>
</tr>
</tbody>
</table>

Note: *p<.05 **p<.01

Instrumentation

Child Behavior Checklist (CBCL)

- Assesses behavioral and emotional problems
- 8 syndrome scores
  - Internalizing
    - Withdrawn
    - Somatic complaints
    - Thought problems
  - Externalizing
    - Social problems
    - Attention problems
    - Delinquent problems
- 17 social competence items and 113 behavior problem items
- Internal consistency (alpha) = .96
- Test-retest reliability (after 7 days) r = .93

Procedures

- 217 children served by SOC and 209 children served by non-funded comparison system
- CBCL administered 1 - 4 occasions within a 24 month timeframe
Analysis

- Random effects Tobit analysis for costs
  - Appropriate when dependent variable is censored at some lower bound like the zero values associated with costs data
- Two level hierarchical linear model for CBCL
  - Calculated individual growth curves for each child in sample
  - Examined group differences based on individual level characteristics of sample

Cost Analysis

**Dependent Variable: Mental Health Costs Only**

<table>
<thead>
<tr>
<th>Time</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC</td>
<td>0.11</td>
<td>0.15</td>
<td>0.02</td>
<td>0.18</td>
<td>0.33</td>
<td>(0.61)</td>
</tr>
<tr>
<td>CBCL Ext. &gt; 63</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Time<em>SOC</em>CBCL</td>
<td>0.04</td>
<td>0.03</td>
<td>0.02</td>
<td>0.04</td>
<td>0.04</td>
<td>(0.06)</td>
</tr>
</tbody>
</table>

**Prior costs: mental health**

- Debt: 0.04 (0.06)
- Income: 0.01 (0.01)

**Prior costs: other sectors**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

**Income < $15,000**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

**Age**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

Note: P-values in parentheses

n = 426, 1 = 4

Cost Analysis

**Dependent Variable: Other Sector Costs Only**

<table>
<thead>
<tr>
<th>Time</th>
<th>Model 1</th>
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<tr>
<td>SOC</td>
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<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Time<em>SOC</em>CBCL</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
<td>(0.06)</td>
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- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

**Age**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

Note: P-values in parentheses

n = 426, 1 = 4

Cost Analysis

**Dependent Variable: Total Costs**

<table>
<thead>
<tr>
<th>Time</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
<th>Model 5</th>
<th>Model 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOC</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>(0.00)</td>
</tr>
<tr>
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<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Time<em>SOC</em>CBCL</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
<td>0.04</td>
<td>(0.06)</td>
</tr>
</tbody>
</table>

**Prior costs: mental health**

- Debt: 0.04 (0.06)
- Income: 0.01 (0.01)

**Prior costs: other sectors**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

**Income < $15,000**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

**Age**

- Debt: 0.01 (0.01)
- Income: 0.01 (0.01)

Note: P-values in parentheses

n = 426, 1 = 4
Child Behavior Checklist
Externalizing Problems T-Scores
Final Estimation of Fixed Effects
Unconditional Model

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
<th>Approximate d. f.</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average CBCL</td>
<td>69.90</td>
<td>0.53</td>
<td>131.26</td>
<td>425</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Est score at entry</td>
<td>66.50</td>
<td>0.77</td>
<td>84.80</td>
<td>425</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Average rate of change</td>
<td>-6.35</td>
<td>0.25</td>
<td>25.50</td>
<td>425</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Average rate of acceleration</td>
<td>1.22</td>
<td>0.36</td>
<td>3.38</td>
<td>425</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Random Effects

<table>
<thead>
<tr>
<th>Component</th>
<th>d. f.</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average CBCL</td>
<td>89.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Est score at entry</td>
<td>86.70</td>
<td>0.01</td>
</tr>
<tr>
<td>Average linear change</td>
<td>42.71</td>
<td>0.01</td>
</tr>
<tr>
<td>Average quadratic change</td>
<td>5.62</td>
<td>0.13</td>
</tr>
</tbody>
</table>

Level 1 error 35.32

 Predictor of CBCL Externalizing T-scores by Prior Cost

![Graph showing predicted CBCL Externalizing T-scores by Prior Cost](image)

Variance Explained at Level 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconditional</td>
<td>54.40</td>
</tr>
<tr>
<td>Conditional</td>
<td>35.32</td>
</tr>
</tbody>
</table>

Proportion of Variance Explained 35.08%

Predicted CBCL Externalizing T-scores by Site

![Graph showing predicted CBCL Externalizing T-scores by Site](image)

Variance Explained at Level 2

<table>
<thead>
<tr>
<th>Model</th>
<th>Initial Status (Intercept)</th>
<th>Change Rate (Linear)</th>
<th>Change Rate (Quadratic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unconditional</td>
<td>89.01</td>
<td>42.71</td>
<td>6.62</td>
</tr>
<tr>
<td>Conditional</td>
<td>83.80</td>
<td>40.60</td>
<td>6.99</td>
</tr>
</tbody>
</table>

Proportion of Variance Explained 5.89% 4.95% 7.92%
Conclusions

- Do costs change over time?
  - Avg. rate of change in log MH costs = -2.17 per year
  - Avg. rate of change in log total costs = -3.60 per year
  - Log other sector costs did not change significantly over time

- Do costs vary as a function of where the child received services?
  - Sites differ in MH spending over time for children with clinical levels of externalizing problems

Conclusions

- Are changes in total costs over time systematically related to specific characteristics of the children being served?
  - Costs for children with clinical levels of symptoms in SOC were higher than for similar children in the non-SOC during first 6 months of service

Conclusions

- Do externalizing problems change over time?
  - On average CBCL Externalizing Problems T-scores decreased by 6.36 points per year over the 24 month period (p <0.01)

- Do outcomes vary as a function of where children received services?
  - marginally significant linear time effect and significant quadratic time effect indicated initially more rapid rate of improvement but greater slowing of improvement for children served in the SOC than for those served in non-SOC

Conclusions

- Are differences in outcomes related to whether child had prior contact with the varying child-serving agencies?
  - Children who had no prior costs had initially higher Externalizing Problems T-scores than those who had any prior costs.
  - Children who had no prior costs also had a greater rate of improvement, but more rapid slowing of the rate of improvement.

Implications

- The Stark County SOC spent current MH dollars in a more targeted manner than the Mahoning County non-SOC during the first 6 months of service.

- This targeted spending occurred in conjunction with a slightly more rapid decrease in symptoms in the first 6 months of services that was statistically significant but not clinically meaningful.

Implications

- Children who enter a system of care with prior costs in other sectors are likely to have higher current costs in other sectors

- Children with prior MH costs likely to have lower current costs in other sectors