The University of Minnesota’s Traumatic Stress Screen for Children and Adolescents (TSSCA):
A Preliminary Analysis
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Based on the research of Katelyn Donisch, Yanchen Zhang, Sophia Frank, Chris Bray, and Abigail Gewirtz

Background
Unrecognized and untreated childhood trauma can lead to the development of trauma-related symptomologies such as distressing recurrent memories and nightmares, physical reactions to trauma reminders, persistent negative emotions, concentration difficulties, and reckless behavior. These symptoms can persist and worsen over time. One way to identify trauma-exposed youth and provide necessary access to evidence-based mental health treatment is through systematic trauma screening in child-service systems, including schools, child welfare, and juvenile justice. The University of Minnesota’s Traumatic Stress Screen for Children and Adolescents (TSSCA) was designed to provide practitioners with an efficient yet precise 5-item tool for screening and identifying children, ages 5 to 18 years, that may have experienced a traumatic event and are in need of services.

Methods
Development
After extensive review of a broad range of diagnostic tools, the research team used item response modeling to create a 15-item instrument with questions representing symptoms of traumatic stress. Multiple stepwise regression was used to extract the 5 top performing items from the 15-item screener.

Sample
• 130 individuals seen in community mental health settings.
• 67 female, 53 male
• Predominantly white (n=83), non-Hispanic
• Representing exposures and symptoms related to a wide variety of trauma types (e.g., domestic violence, neglect, school violence, bereavement, etc.)

Measures
• University of California Post Traumatic Stress Disorder Reaction Index 5 (UCLA-5): a 31-item questionnaire that assesses for symptoms of PTSD in children and adolescents. The UCLA is considered the gold standard assessment for diagnosing PTSD in children and adolescents.
• Sociodemographic questionnaire: A clinician completed brief questionnaire about child age, gender, trauma type, and race/ethnicity.

Data Analysis
• To test for reliability in the TSSCA, coefficient Omega was estimated using R (Dunn, et al., 2013).
• To test for discriminative and criterion validity (i.e. predictive validity), a ROC (Receiver Operating Characteristic; Hisao, Bartko, & Potter, 1989) Curve Analysis was performed using the SPSS package Version 22 (IBM Corp., Armonk, NY). The UCLA -5 was used as the “gold standard of diagnosis” to define true and false cases.
• AUCs for the 5-item TSSCA and the original 15-item version were compared to decide whether the shortened TSSCA version performs equivalently to the full-length version.
• There were no missing values in the variables used for analyses. 28 duplicate cases (e.g. follow-ups) were removed to ensure the assumption of independence.

Results
Reliability and Validity
• The value of Omega was .81, indicating an acceptable level of internal consistency within the TSSCA (Dunn, et al., 2013).
• The AUC for the TSSCA was .87 (SE = .04, 95% Confidence Interval = .80, .95) indicating very good inherent discriminative validity (Hajian-Tilaki, 2013).
• The AUC for the original 15-item version is .89 (SE = .03, 95% Confidence Interval = .83, .95). Visually, the curves for the 5-question and 15-question screens are similar in area (see figure 1). Further statistic testing indicated that the difference between those two AUCs was not significant (Z statistic = .32, SE = .01, p = .75; Delong, et al., 1988) suggesting that the shortened screener (i.e. the TSSCA) functioned equivalently to the full-length version in identifying youth in need of continued trauma evaluation.

Determination of Optimal Cutoff
An optimal cutoff score, with no constraints on cost, benefit and prevalence rates, is the score at which the optimal balance between sensitivity and specificity was achieved, depending on the purpose of the screener. Several potential optimal cutoffs were identified for the TSSCA, including 5, 6 and 7. The authors determined that a score of 6 was the optimal cutoff for the TSSCA. With a cutoff of 6, the sensitivity of the of the screener was 82.76%, specificity was 85.42%, positive predictive value was 87.27% and negative predictive value was 80.99%.

Table 1. The screen performance indices for potential cutoffs

<table>
<thead>
<tr>
<th>Potential cutoff</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
<th>Youden J</th>
<th>d2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100.00%</td>
<td>62.5%</td>
<td>100.00%</td>
<td>0.05</td>
<td>0.88</td>
<td></td>
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<tr>
<td>2</td>
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<td>66.67%</td>
<td>100.00%</td>
<td>0.17</td>
<td>0.80</td>
<td></td>
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<tr>
<td>3</td>
<td>100.00%</td>
<td>39.58%</td>
<td>66.67%</td>
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<td>0.37</td>
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<tr>
<td>4</td>
<td>86.52%</td>
<td>52.08%</td>
<td>79.89%</td>
<td>0.49</td>
<td>0.23</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>85.66%</td>
<td>64.58%</td>
<td>75.36%</td>
<td>0.54</td>
<td>0.14</td>
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<tr>
<td>6</td>
<td>82.78%</td>
<td>85.42%</td>
<td>87.27%</td>
<td>0.68</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>87.24%</td>
<td>88.58%</td>
<td>88.64%</td>
<td>0.93</td>
<td>0.57</td>
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</tr>
<tr>
<td>8</td>
<td>77.59%</td>
<td>91.67%</td>
<td>80.00%</td>
<td>0.19</td>
<td>0.53</td>
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<tr>
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<td>87.29%</td>
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<tr>
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<td>97.92%</td>
<td>92.31%</td>
<td>0.54</td>
<td>0.19</td>
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</tr>
</tbody>
</table>

Note: PPV stands for Positive Predictive Value, NPV stands for Negative Predictive Value. Values for cutoffs of 11 and 12 are not available due to the empty cells in cross-tabulation.

References and additional resources available

upon request from the author
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Figure 1. The TSSCA form.

Figure 2. Diagram illustrating the development process of the TSSCA.

Figure 3. The ROC curves for the 5, 6, and 15 item versions of the TSSCA.