

CANS Reliability and Validity:

Executive Summary

[A] RELIABILITY

[B] VALIDITY

[C] PEER REVIEWED CONFERENCE PRESENTATIONS

NOTE: All persons who use the CANS in service settings are required to be certified as reliable on the instrument. This is done centrally (by the Praed Foundation, at canstraining.com) to maintain standardization across all users, across all implementations of the CANS. All users are required to demonstrate the ability to rate items across the instrument at an intraclass correlation of 0.70 or higher. This is alluded to in nearly every published study of the CANS. For instance, "First, all individuals who complete the CANS must be trained and certified with a minimum reliability of 0.70. In most jurisdictions the average reliability of those certified is well above 0.80 on test case vignettes. The average reliability of assessors for the Integrated Assessment is about 0.85 annually. Second, annual recertification is required to ensure that individuals using the CANS maintain reliability over time" (Lyons, J. S., McClelland, G., & Jordan, N. (2010); "In order to become a Certified Trainer, trainees must achieve a competency of 80% correct on two test vignettes, which corresponds to a Kappa value of over .75. The remaining SOC staff is then trained by the CANS-MH Certified Trainer in how to administer the CANS-MH, and must achieve a reliability of 80% correct on the two test vignettes. Chart reviews are regularly conducted throughout the year to ensure that reliability remains high" Dunleavy, A. M., & Leon, S. C. (2011); "Every CANS user must have at least a bachelor's degree, complete a CANS training module based on case vignettes/records, and meet at least 0.70 reliability for annual re-certification," Chor, K. H. B., McClelland, G. M., Weiner, D. A., Jordan, N. and Lyons, J. S. (2014).

[A] RELIABILITY

Strong evidence from multiple reliability studies indicates that the CANS can be completed reliably by individuals working with youth and families. A number of individuals from different backgrounds have been trained and certified to use the CANS assessment reliably including health and mental health providers, child welfare case workers, probation officers, and family advocates. With approved training, anyone with a bachelor's degree can learn to complete the tool reliably, although some applications or more complex versions of the CANS require a higher educational degree or relevant experience. The average reliability of the CANS is 0.78 with vignettes across a sample of more than 80,000 trainees. The reliability is higher (0.84) with case records, and can be above 0.90 with live cases (Lyons, 2009). The CANS[®] is auditable and audit reliabilities demonstrate that the CANS[®] is reliable at the item level (Anderson et al., 2001). Training and certification with a reliability of at least 0.70 on a test case vignette is required for ethical use. In most jurisdictions, re-certification is annual. A full discussion on the reliability of the CANS assessment is found in Lyons (2009) *Communimetrics: A Communication Theory of Measurement in Human Service Settings*.

Anderson, R. L., Lyons, J. S., Giles, D. M., Price, J. A., & Estle, G. (2003). Reliability of the child and adolescent needs and strengths-mental health (CANS-MH) scale. *Journal of Child and Family Studies*, 12(3), 279-289. Establishes the reliability of the scale.

The CANS-MH was completed by caseworkers and independently by two non-clinical researchers. Inter-rater reliability was .81 overall and ranged from .72 for problem presentation to .85 for functioning on individual subscales. Caseworkers tended to give higher severity ratings on items relating to psychosis, antisocial behavior, sexual development, transportation needs, and relationship permanence than researchers.

Anderson, R. L. & Gittler, J. (2005). Unmet need for community-based mental health and substance use treatment among rural adolescents. *Community Mental Health Journal*, 41, 35-49.

Replicated finding of chart review reliability, inter-rater reliability reported as = 0.82. Also demonstrated convergence of chart-based mental health and substance use diagnoses and CANS-rated symptoms, indicating convergent construct validity.

Carson, N. J., Stewart, M., Lin, J. Y., & Alegria, M. (2011). Use and quality of mental health services for Haitian youth. *Ethnicity & health*, 16(6), 567-582.

Replicated finding of chart review reliability for ADHD and Depression / Anxiety items. "Reliability for the Attention-Deficit and the Depression/Anxiety items was calculated by grouping the CANS scores in three categories: no/minimal need (score 0 or 1); current/severe need (score 2 or 3); or not recorded. Inter-rater reliability between the primary rater and the other two raters was high for Attention-Deficit (kappa = 0.82 - 0.91) and moderate to high for Depression/Anxiety (kappa = 0.58 - 0.79)."

Lyons, J. S., MacIntyre, J. C., Lee, M. E., Carpinello, S., Zuber, M. P., & Fazio, M. L. (2004). Psychotropic medications prescribing patterns for children and adolescents in New York's public mental health system. *Community mental health journal*, 40(2), 101-118.

Expert reviewers' record-review reliability of the CANS-MH items reported as a weighted correlation coefficient of 0.86 (p.104), indicating high reliability when used as a record-review tool. A total sample of 1592 randomly selected (statewide) cases were selected and reviewed. The sample was taken from the population of children ages 8–17 who received state (Office of Mental Health) or federal (Medicaid) funding for mental health services.

[B] VALIDITY

Studies have demonstrated the CANS' validity, or it's the ability to measure and their caregiver's needs and strengths. In a sample of more than 1,700 cases in 15 different program types across New York State, the total scores on the relevant dimensions of the CANS-Mental Health retrospectively distinguished level of care (Lyons, 2004). The CANS[®] assessment has also been used to distinguish needs of children in urban and rural settings (Anderson & Estle, 2001). In numerous jurisdictions, the CANS has been used to predict service utilization and costs, and to evaluate outcomes of clinical interventions and programs (Lyons, 2004; Lyons & Weiner, 2009; Lyons, 2009). Five independent research groups in four states have demonstrated the reliability and validity of decision support algorithms using the CANS (Chor, et al, 2012, 2013, 2014; Cardall, et al, 2016; Epstein, et al, 2015; Israel, et al, 2015, Lardner, 2015).

Chor, K. H. B., McClelland, G. M., Weiner, D. A., Jordan, N. and Lyons, J. S. (2014). Out-of-home placement decision-making and outcomes in child welfare: a longitudinal study. *Administration and Policy in Mental Health*, DOI: 10.1007/s10488-014-0545-5

Children in this study varied in terms of whether their placement decisions was made consistent or inconsistent with a CANS-based algorithm. For these children, placement decisions made inconsistent with the recommendations of the algorithm resulted in worse functioning and symptomatic outcomes. This study demonstrates both that meaningful differences in CANS-tracked outcomes can be detected among children with complex needs, and that the use of CANS-based algorithms improves on group-based clinical decision-making (establishes criterion validity).

Dunleavy, A. M., & Leon, S. C. (2011). Predictors for resolution of antisocial behavior among foster care youth receiving community-based services. *Children and Youth Services Review*, 33(11), 2347-2354.

Among child welfare youth, CANS items can accurately predict which among those with anti-social behavior are likely to resolve that behavior. This indicates criterion validity of the instrument, with the criterion here being a clinical outcome of interest (the resolution of antisocial behavior). "Classification performance statistics were computed for the full CTA model for antisocial behavior, as well as the statistics for each of the resolution and no resolution group. The overall model was predicted with 89.3% accuracy. The mean sensitivity across classes was 90.8%, with a sensitivity of 87.2% for the resolution of antisocial behavior group and 94.4% for the group that did not experience resolution. The mean specificity across classes was similar, with a mean of 90.0% for the full CTA model. Specificity for the group that experienced resolution was 86.7% and 93.3% for the group whose antisocial behavior did not resolve. The overall classification tree predicted resolution 78.6% above chance, which is considered to be a "strong" effect strength according to parameters set forth by Yarnold and Soltysik (2005)."

Lyons, J. S., Griffin, G., Quintenz, S., Jenuwine, M. & Shasha, M. (2003). Clinical and forensic outcomes from the Illinois Mental Health Juvenile Justice initiative. *Psychiatric Services*, 54, 12, 1629-1634.

This study demonstrated that the CANS could detect positive functional outcomes as a result of treatment, with similar or greater sensitivity to effects than another well-validated measure of outcomes, the Child and Adolescent Functional Assessment Scale (CAFAS). "Youths who were rearrested were compared with those who were not on each of the CANS-MH items at enrollment. All the items that were statistically significant in this univariate comparison were entered into a logistic regression model predicting rearrest. The overall model was statistically significant ($\chi^2=38.19$, $df=10$, $p<.001$), accurately classifying 68 percent of youths. The significance of individual CANS-MH items is shown in Table 3. Four items stand out as contributing uniquely to the prediction model—runaway risk, sexually abusive behavior, religious or spiritual strengths, and talents and interests. Runaway risk increased the likelihood of rearrest. The presence of sexually abusive behavior was associated with a decreased risk. The presence of spiritual or religious strengths and of talents and interests were associated with a decreased risk of rearrest. No CAFAS scale scores predicted rearrest."

Lyons, J. S., McClelland, G., & Jordan, N. (2010). Fire setting behavior in a child welfare system: Prevalence, characteristics and co-occurring needs. *Journal of child and family studies*, 19(6), 720-727.

Consistent with hypotheses from previous research into fire-setting behavior, fire-setting behavior (as measured by the CANS) risk increases with age, male gender, exposure to specific traumatic events, and oppositional behavior, attachment problems, and depression as clinical risks for fire-setting behavior (convergent construct validity). The presence of internal and contextual child strengths is associated with lower risk of fire-setting behavior (divergent construct validity).

Sieracki, J. H., Leon, S. C., Miller, S. A., & Lyons, J. S. (2008). Individual and provider effects on mental health outcomes in child welfare: A three level growth curve approach. *Children and Youth Services Review*, 30(7), 800-808.

This study finds that the CANS-MH items are a sensitive measure of treatment-related change, including change attributable to multiple, nested sources.

Weiner, D. A., Schneider, A., & Lyons, J. S. (2009). Evidence-based treatments for trauma among culturally diverse foster care youth: Treatment retention and outcomes. *Children and Youth Services Review*, 31(11), 1199-1205.

CANS detected treatment effects of high-fidelity evidence based treatments for children and youth with traumatic stress symptoms. Treatment effects were largely invariant across client ethnic groups, but related to treatment and theory-relevant variables, such as time in treatment and initial traumatic stress symptoms.

[C] PEER REVIEWED CONFERENCE PRESENTATION

Dilley, J. B., Weiner, D. A., Lyons, J. S. & Martinovich, Z. (2003). The validity of the Child and Adolescent Needs and Strengths assessment. Presented at the 111th Convention of the American Psychological Association, Toronto, Canada.

Demonstrated moderate correlations between CANS and CAFAS subscales measuring similar constructs (convergent validity), and lower correlations between subscales measuring dissimilar constructs (divergent construct validity).