

## **Reliability of the Child and Adolescent Needs and Strengths-Mental Health (CANS-MH) Scale**

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*We examined the interrater reliability of the Child and Adolescent Needs and Strengths-Mental Health (CANS-MH) scale among researchers and between researchers and clinicians. All children presenting to a treatment facility for either protective or mental health needs were eligible to be included in the study. As part of standard assessment procedure, all children entering the facility were described by caseworkers using the CANS-MH. A random sample of 60 cases was selected and researchers made retrospective assessments using the CANS-MH based on chart review. Results of the interrater reliability support previous findings that the CANS-MH is a reliable measure of clinical and psychosocial needs and strengths. Results also suggest that ratings on the CANS-MH based on medical record abstraction by researchers relate to ratings performed by clinical staff, demonstrating the clinical and research utility of the CANS-MH. The CANS-MH can be used reliably to assess the type and severity of problem presentation, risk behaviors, functioning, care intensity and organization, caregiver capacity and strengths among children with protective and mental health needs. In addition, items of the CANS-MH appear to be reliable supporting the use of these items*

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*individually. Findings are relevant to the ongoing delivery of clinical services, monitoring of quality assurance, and outcomes.*

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The growing attention to the development of systems of care (e.g., the Child and Adolescent Service System Program and the Robert Wood Johnson Foundation's Mental Health Services Program for Youth) for children's mental health highlights the importance of documenting the experience and results of an evolving service delivery system (Stroul, McCormack, & Zaro, 1996). Progress has been made in identifying appropriate outcome indicators and designing methodologies for evaluating individual, program and system outcomes. The potential value of using clinical outcome measures to enhance the quality of services and the accountability of service providers has been recently recognized. This has led to the development of a number of approaches to measuring outcomes (Burns, 1996; Rosenblatt, 1993; Sederer, Dickey & Hermann, 1996). For measurement strategies that rely on the reports of clinicians and other service providers, interrater reliability is a critical characteristic of the measure.

The *Child and Adolescent Needs and Strengths* for children and adolescents with mental health challenges (CANS-MH) represents a novel approach to outcomes measurement. Rather than emphasizing traditional psychometric properties such as internal consistency or factor structure in order to identify a parsimonious set of items that add to a total score, the CANS-MH approaches measurement from a communication perspective (Lyons, 2000). Specifically, the CANS-MH selects items based on treatment and setting decision-making and designs the anchors on these items so that they relate directly to clinical decision-making. This results in a measure that emphasizes the rater's ability to completely but concisely describe the characteristics of the youth and his/her family in a way that is directly translatable into service planning even without any "scoring." However, for this to be feasible, interrater reliability, even at the individual item level is required.

The CANS-MH presents an advantage over other currently available instruments. While this assessment approach is associated with other common measures of psychopathology among children (e.g., the Child and Adolescent Functional Assessment Scale and the Child Behavior Checklist) it has a demonstrated relationship to service planning and level-of-care decision-making (Kisiel et al., 1999). The CANS-MH provides a comprehensive assessment of the type and severity of clinical and psychosocial factors that may impact treatment decisions and outcomes. For example, as reliance on diagnostic criteria to model psychiatric services has generated little success (Allen, Coyne, Beasley, & Spohn, 1987; Goldman, Pincus, & Morton, 1990; Mezzich & Coffman, 1985; Zwanziger, Davis, Bamezai, & Hosek, 1991), symptoms represent key indicators for treatment

decisions. Although symptoms are important for treatment planning, they do not drive level-of-care decisions. The intensity of treatment is indicated by the number and severity of presenting risk factors (Lyons, Shallcross, & Sokol, 1998). Risk behaviors (e.g., dangerousness to others) tend to drive decisions on the use of more intensive treatments and levels of care (Lyons et al., 1997). Further, in the presence of either symptoms or risk (or both), different treatment and setting decisions will be made depending on environmental systems factors indicating the capacities of the caregiver (Lyons et al., 1998; Woodward, Dowdney, & Taylor, 1997). Using the CANS-MH to measure these dimensions in concert provides an opportunity for broader understanding of the mental health needs presented by children.

An additional advantage of the CANS-MH is its assessment of strengths. There has been an increased focus on the importance of strengths and on strength-based treatment (Cole & Poe, 1993; Powell, Batsche, Ferro, Fox, & Dunlap, 1997; Walsh, 1998). Preliminary data indicate improved outcomes for children as a result of participation in strength-based programs (Bruns, Burchard, & Yoe, 1995; Rosenblatt, 1996). This growing body of research suggests that an integrative approach to understanding the mental health needs, resources and assets of children offer the best opportunity to address program and system planning.

Information gathered using the CANS-MH can be collected either prospectively or from archival data. The CANS-MH has been used by researchers to assess clinical and psychosocial needs using medical chart review and by clinicians to guide level-of-care decisions and service planning. While concerns over the use of archival data in research have been documented (Aaronson & Burman, 1994), archival reviews have been shown to be valuable, valid and reliable sources of information regarding the characteristics of children with mental health challenges (Burchard & Schaefer, 1992; Quinn, Epstein, Cumblad, & Holderness, 1996). Literature supports the reliability and the validity of the Child and Adolescent Needs and Strengths-Mental Health (CANS-MH) as a chart review methodology across a number of settings and documents adequate interrater reliability among researchers (Leon, Lyons, & Uziel-Miller, 2000; Leon, Lyons, Uziel-Miller, & Tracy, 1999; Lyons, Howard, O'Mahoney, & Lish, 1997; Lyons, Mintzer, Kisiel, & Shallcross, 1998; Lyons, Uziel-Miller, Reyes & Sokol, 2000). This research suggests that the items of the CANS-MH can be assessed consistently among researchers and that the availability of archival information needed to rate CANS-MH items has been high and consistent across service sites. However, there is no published information regarding the interrater reliability between researchers and clinicians using the CANS-MH. Confidence in this methodology as both a research and clinical tool would be enhanced by data documenting how ratings completed based on medical record abstraction by researchers relate to ratings performed by clinical staff.

Communication among partners in the mental health service system is critical and is a fundamental aspect in the assessment of service needs and outcomes, system development initiatives to reduce fragmentation, and to increase joint service

planning, development and coordination (Stroul, McCormack, & Zaro, 1996). A communication strategy is a priority in the use of the CANS-MH; raters must all be "speaking the same language" if a communication strategy is to work. Similarly, implications for service planning must be comparable regardless of who is completing the tool; as such, interrater reliability is essential. The present study evaluates the reliability of the CANS-MH within its actual application in a large agency providing protective and mental health services to children and families. By comparing CANS-MH data completed by treating clinicians with independent researchers trained in the application of the measure, we study the reliability of this novel approach to measurement.

## METHODS

### Subjects

All children and adolescents ( $n = 80$ ) that were admitted from November 2000 through January 2001 to a facility that provides community-based protective and/or mental health treatment services were eligible. There were no other exclusion criteria. Sixty cases were randomly chosen and included in the study. Since there is little statistical advantage between including 60 and 80 cases as long as the sample is random, 60 cases were chosen to ensure that sufficient ratings were available on individual items without burdening or exhausting unnecessary resources of the collaborating agency.

### Settings

The facility is located in a metropolitan area of eastern Iowa and is a comprehensive treatment facility for children and families. The facility provides family crisis services, foster care and adoption services and inpatient and outpatient mental health services for children and adolescents. While the majority of cases served reside in the same county as the treatment facility, about one-third of children and families that present to the facility live outside of the county. The facility has a daily census of about 750 children and all children and families served are Medicaid eligible. While children and families can self-refer to the facility for services, most referrals come from other sources including schools, the courts, child welfare and primary care physicians.

The facility uses the CANS-MH measure across all services for purposes of clinical case management. The CANS-MH is completed by each caseworker at admission, quarterly review and discharge on all community-based cases. Community-based caseworkers had begun using the CANS-MH five months prior to the study period. All caseworkers were trained in the use of the measure by

the second author (JSL), a clinical psychologist and author of the instrument. All community-based caseworkers hold a bachelors or masters degree in social work or related field and have two years of experience.

### **Procedure**

A list containing all admissions to community-based services from November 2000 through January 2001 was obtained from facility administration. Sixty cases were randomly selected for inclusion and assessed based on retrospective chart review. Cases were reviewed using the CANS-MH tool based on admission information only. Two nonclinical researchers independently rated all cases using this measure (RLA and DMG). Researchers were also trained in the use of the measure by the second author (JSL). Each assessment took approximately 15 minutes to complete. After completion of case review, copies of the CANS-MH rated by caseworkers at admission were obtained from administrators for all included cases. Ratings from 17 caseworkers were represented. Intraclass correlations (2-way mixed effect model, consistency definition) among researchers and between researchers and caseworkers were calculated using Statistical Packages for the Social Sciences (SPSS).

### **Measures**

The CANS-MH (Lyons, 1999) was used to assess clinical status at admission using a retrospective chart review. The CANS-MH is intended to serve as a case descriptor and decision-support tool for purposes of treatment planning and level-of-care decision making for case managers and clinical care staff. The CANS-MH can also be used to monitor change resulting from service utilization. The measure included 41-items that identified type and severity of clinical and psychosocial needs and resources. Information regarding the multidimensional aspects of particular mental health problems were assessed including symptoms (e.g., depression and attention deficit hyperactivity disorder), risk behaviors (e.g., danger to self and danger to others), functioning (e.g., school and family), care intensity and organization (e.g., monitoring and treatment), caregiver capacity (e.g., safety and knowledge), and resources/strengths (e.g., family and interpersonal relationships). Completing the CANS-MH involved making ratings on four-point scales (0 = no evidence through 3 = severe dysfunction) across all relevant items that emphasized the service planning implications of each dimension. For example, a risk behavior that requires no attention would be rated a "0," a "1" indicates a dimension that requires additional assessment, monitoring, or preventive services, a "2" indicates a dimension that requires action in the service plan, and a "3" indicates a dimension that requires immediate or intensive

action. Training emphasized anchor points relevant to each level and item of the CANS-MH.

In completing the CANS-MH at admission, caseworkers used a variety of information sources to address each item including interviews with children and their families and discussion with or reports from physicians, courts and school representatives.

## RESULTS

Clinical and psychosocial needs were assessed at admission for 60 cases. The average age of children was 10 years (range 7 days to 17.5 years) and 42% ( $n = 25$ ) were female. Among all children, 78% ( $n = 47$ ) were white, 10% ( $n = 6$ ) were black, 8% ( $n = 5$ ) were biracial, and 3% ( $n = 2$ ) were Hispanic.

### Interrater Reliability Between Caseworkers and Researchers

The interrater reliability (intraclass correlation) between caseworkers and researchers for the total scale was .81. Interrater reliabilities were also calculated for each dimension and were .72 for problem presentation, .76 for risk behaviors, .85 for functioning, .75 for care intensity and organization, .75 for caregiver capacity, and .77 for strengths (see Table I). Table II presents the percent agreement between caseworkers and researchers on each item of the CANS-MH.

In examining service planning implications, 52% of all coding differences at the item level between caseworkers and researchers did not affect action in the treatment plan. In other words, differences were between a coding of "0" and "1" or between a "2" and "3."

There were no differences between caseworkers and researchers in ratings of severity by scale or dimension. However, in examining ratings of severity by item, caseworkers coded reliably higher levels of severity on psychosis ( $t = 2.65$ ,  $df = 118$ ,  $p < .009$ ), antisocial ( $t = 2.09$ ,  $df = 118$ ,  $p < .04$ ), sexual development

**Table I.** CANS-MH Dimension and Scale Intraclass Correlations: Between Clinicians and Researchers (C-R) and Among Researchers (R-R)

	C-R	R-R
Problem Presentation	.72	.84
Risk Behaviors	.76	.82
Functioning	.85	.85
Care Intensity and Organization	.75	.77
Caregiver Capacity	.75	.68
Strengths	.77	.84
Total	.81	.85

**Table II.** CANS-MH Item Percent Agreement: Between Clinicians and Researchers (C-R) and Among Researchers (R-R)

	C-R	R-R
<b>Problem Presentation</b>		
Psychosis	.82	.96
Attention Deficit/Impulse	.55	.80
Depression/Anxiety	.75	.65
Oppositional Behavior	.61	.82
Antisocial Behavior	.67	.82
Substance Abuse	.84	.90
Adjustment to Trauma	.73	.69
Situational Consistency	.65	.63
Temporal Consistency	.67	.61
<b>Risk Behaviors</b>		
Danger to Self	.80	.86
Danger to Others	.73	.71
Elopement	.78	.82
Sexual Development	.80	.90
Sexually Abusive Behavior	.84	.98
Social Behavior	.76	.67
Crime/Delinquency	.86	.84
<b>Functioning</b>		
Intellectual	.90	.94
Physical/Medical	.84	.84
Family	.71	.69
School	.57	.67
<b>Care Intensity and Organization</b>		
Monitoring	.67	.70
Treatment	.65	.67
Transportation	.67	.78
Service Permanence	.82	.61
<b>Caregiver Capacity</b>		
Physical/Behavioral Health	.67	.63
Supervision	.67	.65
Involvement	.65	.71
Knowledge	.77	.71
Organization	.61	.79
Resources	.69	.77
Residential Stability	.82	.84
Safety	.77	.80
<b>Strengths</b>		
Family	.65	.69
Interpersonal	.69	.69
Relationship Permanence	.65	.69
Educational	.69	.69
Vocational	.80	.88
Well-being	.77	.73
Spiritual/Religious	.63	.75
Talents/Interests	.78	.77
Inclusion	.67	.67

( $t = 3.18$ ,  $df = 118$ ,  $p < .002$ ), transportation ( $t = 5.10$ ,  $df = 118$ ,  $p < .0001$ ), and relationship permanence ( $t = 6.96$ ,  $df = 118$ ,  $p < .0001$ ) as compared to researchers.

### Interrater Reliability Among Researchers

The interrater reliability among researchers for the total scale was .85 (intra-class correlation). Interrater reliabilities for each dimension were .84 for problem presentation, .82 for risk behaviors, .85 for functioning, .77 for care intensity and organization, .68 for caregiver capacity, and .84 for strengths (see Table I). Table II presents the percent agreement among researchers on each item of the CANS-MH.

In examining service planning implications, 60% of all coding differences at the item level between researchers did not affect action in the treatment plan; differences were between a coding of "0" and "1" or between a "2" and "3."

## DISCUSSION

Results of the interrater reliability support previous findings that the CANS-MH is a reliable measure of clinical and psychosocial needs and strengths when used among researchers (Leon et al., 1999, 2000; Lyons et al., 1997, 1998, 2000). Results also suggest that ratings on the CANS-MH based on medical record abstraction by researchers relate to ratings performed by clinical staff, demonstrating the clinical and research utility of the CANS-MH. The CANS-MH can be used reliably to assess the type and severity of problem presentation, risk behaviors, functioning, care intensity and organization, caregiver capacity and strengths among children with protective and mental health needs. Findings suggest that the instrument would be useful to assist the ongoing delivery of clinical services such as service planning and clinical decision-making, and serve as an administrative and research tool to monitor quality assurance or assess outcomes.

In examining service planning implications, 52% of all coding differences between caseworkers and researchers did not affect action in the treatment plan. In other words, differences were between a coding of "0" and "1" or between a "2" and "3" suggesting that sufficiently similar levels of action were achieved. In terms of service planning, the higher this percentage the more likely children are to receive appropriate services that match their needs and appropriate levels of care.

When there were coding differences regarding service planning (e.g., differences between watchful waiting and a need for action), caseworkers rated a higher severity as compared to researchers. In particular, caseworkers coded higher levels



of severity on psychosis (means = .17 and .02), antisocial (means = .68 and .42), sexual development (means = .28 and .05), transportation (means = .60 and .05), and relationship permanence (means = 1.20 and .63) as compared to researchers. For example, a researcher may have given a rating of "1" for antisocial and a caseworker may have coded the same case as a "2". These differences suggest at least two explanations. First, the case file may not have reflected the same information that caseworkers had available for decision-making. For example, caseworkers may have asked children and families about transportation needs, but findings were not documented in the chart. Second, in some cases, the decision to treat was made when treatment may not have been necessary. In terms of service planning, only five items showed a reliable coding difference, however, the fewer items affected, the more likely children will receive only those services required to address their individual needs. Otherwise, misallocated services inappropriately tax a limited pool of resources and can be ineffective. However, coding differences must be viewed within the context of understanding issues of supply, payment and other service system factors that determine access to services. Policies that guide the distribution of resources (e.g., reimbursement mechanisms) can be restrictive leading to the prioritization of assessing one need (e.g., temporary foster care families as caregivers) and the preclusion of attention to others (e.g., assessing the biological family as caregivers) (Altschuld & Witkin, 2000). Higher levels of reliability may be achieved to the extent that researchers are aware of local conditions and policies under which organizations function.

The present findings also suggest that the CANS-MH can be used in measurement audit approaches (Lyons, Rawal, Yeh, Leon & Tracy, 2001). In other words, a retrospective use of the CANS-MH to monitor the reliability of prospective use is feasible.

Given its demonstrated reliability, results suggest that the CANS-MH may be an efficient and cost effective method for gathering information to address program and system level needs. A growing literature has emphasized the importance of understanding client needs to assist in service system development (Burns & Freidman, 1990; Costello et al., 1996; Epstein, Quinn, Cumblad, & Holderness, 1996; Kamis-Gould & Minsky, 1995; Kroll et al., 1999; Quinn, Epstein, Cumblad, & Holderness, 1996; Saxe & Cross, 1998; Sheldrick, 1999) and recommends needs assessment as a first step in a larger effort to reform mental health service delivery. The goal of needs assessment is to obtain sufficient data to make informed system decisions without becoming a time-consuming, expensive data collection process that becomes a barrier to system growth and change (Quinn et al, 1996). Findings suggest that the CANS-MH can be completed in a timely manner with sufficient reliability and may provide communities with opportunities to identify the nature of their target population's service needs, the current system's ability to meet those needs, and to identify an oversupply of services or gaps in care, in order to prioritize goals for system development (Kamis-Gould & Minsky, 1995).

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