NEW RESEARCH

Development of Three Web-Based Computerized Versions of the Kiddie Schedule for Affective Disorders and Schizophrenia Child Psychiatric Diagnostic Interview: Preliminary Validity Data

Lisa Townsend, PhD, Kenneth Kobak, PhD, Catherine Kearney, MA, Michael Milham, MD, PhD, Charissa Andreotti, PhD, Jasmine Escalera, PhD, Lindsay Alexander, MPH, Mary Kay Gill, MSN, Boris Birmaher, MD, Raeanne Sylvester, MSW, Dawn Rice, MS, Alison Deep, MCA, Joan Kaufman, PhD

Objective: To present initial validity data on three web-based computerized versions of the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS-COMP).

Method: The sample for evaluating the validity of the clinician-administered KSADS-COMP included 511 youths 6–18 years of age who were participants in the Child Mind Institute Healthy Brain Network. The sample for evaluating the parent and youth self-administered versions of the KSADS-COMP included 158 youths 11-17 years of age recruited from three academic institutions.

Results: Average administration time for completing the combined parent and youth clinician-administered KSADS-COMP was less time than previously reported for completing the paper-and-pencil KSADS with only one informant (91.9 ± 50.1 minutes). Average administration times for the youth and parent self-administered KSADS-COMP were 50.9 ± 28.0 minutes and 63.2 ± 38.3 minutes, respectively, and youths and parents rated their experience using the web-based self-administered KSADS-COMP versions very positively. Diagnoses generated with all three KSADS-COMP versions demonstrated good convergent validity against established clinical rating scales and dimensional diagnostic-specific ratings derived from the KSADS-COMP. When parent and youth self-administered KSADS-COMP data were integrated, good to excellent concordance was also achieved between diagnoses derived using the self-administered and clinician-administered KSADS-COMP versions (area under the curve = 0.89–1.00).

Conclusion: The three versions of the KSADS-COMP demonstrate promising psychometric properties, while offering efficiency in administration and scoring. The clinician-administered KSADS-COMP shows utility not only for research, but also for implementation in clinical practice, with self-report preinterview ratings that streamline administration. The self-administered KSADS-COMP versions have numerous potential research and clinical applications, including in large-scale epidemiological studies, in schools, in emergency departments, and in telehealth to address the critical shortage of child and adolescent mental health specialists.

Key words: child and adolescent psychiatric diagnoses, computerized assessment, KSADS

J Am Acad Child Adolesc Psychiatry 2019;■(■):■–■.

This article describes preliminary validity data for three updated, web-based computerized versions of the Kiddie Schedule for Affective Disorders and Schizophrenia for school-age children (KSADS-COMP):[1] a clinician-administered version, a self-administered youth version, and a self-administered parent version. The paper-and-pencil KSADS was originally developed in 1978 as an extension of the adult version of the Schedule of Affective Disorders and Schizophrenia (SADS).[2] The paper-and-pencil version of the KSADS has been translated into more than 30 different languages and has undergone several revisions, as reviewed elsewhere.[3] The paper-and-pencil version of the KSADS has been the diagnostic instrument used in multiple studies sponsored by the National Institutes of Health and the pharmaceutical industry,[4-8] including clinical trials that evaluated treatments for attention-deficit/hyperactivity disorder (ADHD),[9,10] oppositional defiant disorder (ODD),[11] major depressive disorder (MDD),[12,13] anxiety disorders,[14] early-onset bipolar disorder,[6] schizophrenia,[5] posttraumatic stress disorder (PTSD),[15] among many others. Many of the

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

clinical trials that employed the KSADS have resulted in changes in pediatric drug labeling by the U.S. Food and Drug Administration (FDA). It has also been used as a validation instrument in large-scale epidemiological studies of psychiatric disorders in youths.[16-18]

Standardized interviews such as the KSADS are associated with increased identification of suicidal ideation and disorders underreported in unstructured assessments.[19,20] The paper-and-pencil KSADS has demonstrated superior diagnostic accuracy compared with traditional unstructured diagnostic assessments, particularly for complex, highly comorbid cases in outpatient, emergency department, and inpatient settings.[21,22] Furthermore, prior work has shown that computerized versions of paper-and-pencil scales are superior to the paper-and-pencil versions, with branching and scoring errors minimized when computerized assessment instruments are used.[23-25]

The paper-and-pencil version of the KSADS was designed to assess present and past symptoms according to *DSM-IV* criteria.[1] It is a semistructured diagnostic interview with probes that evaluate specific symptoms using objective criteria regarding symptom intensity and frequency. The probes for each symptom included in the instrument are designed to be used flexibly, giving interviewers ample leeway for clarifying questions and probing further as needed to score individual items.

The paper-and-pencil KSADS consists of three primary components: 1) an unstructured introductory interview, 2) a diagnostic screening interview, and 3) supplements to finalize the criteria required for each diagnosis. The unstructured introductory interview gathers demographic information; family composition and history of psychiatric illness data; a brief description of the presenting problem; history of prior mental health treatment; and general information about the child's interests and adaptive functioning (hobbies, friendships, behavior and performance at school), with new questions added to the unstructured introductory interview of the KSADS-COMP about bullying, sexual orientation, and gender identification. The introductory interview is a critical component of the KSADS because it helps to establish rapport, generate hypotheses about likely relevant diagnoses, and establish a context to elicit symptoms and evaluate the child's functioning. The diagnostic screening interview surveys two to four symptoms of each disorder assessed in the KSADS, with skip out criteria that determine if the supplements for those disorders should be administered. The screen interview is designed to provide a good diagnostic overview and when completed in its entirety before moving to the supplements greatly facilitates differential diagnoses. Diagnostic supplements are then administered in the chronological order in which probable diagnoses emerged except when the onset of one disorder (eg, a substance use disorder) may have influenced the presentation of the other diagnosis (eg, mood disorder).

All three versions of the KSADS-COMP have retained the three primary components of the paper-and-pencil KSADS—the unstructured introductory interview, the screen interview, and the diagnostic supplements. However, four major changes were made in developing the three KSADS-COMP versions. First, the instrument was updated to reflect *DSM-5* diagnostic criteria; second, the instrument was computerized, including automated scoring algorithms and data capture features; third, the KSADS-COMP was designed to generate both categorical diagnoses and diagnosis-specific dimensional rating scales of current symptoms; and fourth, the scoring criteria were modified so that the response options for all current symptoms are scored using the same standardized 5-point rating scale. The frequency of all current symptoms over the past 2 weeks is now rated on one common metric in all three versions of the KSADS-COMP (eg, not at all, rarely, several days, more than half the days, and nearly every day). The threshold for clinical significance varies depending on the item. For example, the threshold for failure to fulfill a major role obligation associated with substance use (eg, missing school due to substance use) is lower than the threshold for depressive irritability, given that missing school "rarely" or only once during a 2-week period can signal a potential substance misuse disorder, whereas the threshold for irritability in the depressive disorders section is "more than half the days." The paper-and-pencil version of the KSADS has unique scoring criteria for every item, making training and establishing reliability in administration problematic. Q7

Questions included in the KSADS-COMP were written at a sixth grade Flesch-Kincaid level. Some of the probes included in the KSADS-COMP were modified from the paper-and-pencil version of the KSADS; some were developed by the investigative team; and as in the development of past versions of the KSADS, others were developed with input from experts in the field (see Acknowledgments section for list of experts who provided input on the development and/or refinement of KSADS-COMP probes and/or scoring criteria).

The three versions of KSADS-COMP assess the same set of diagnoses contained in the *DSM-5*–updated version of the paper-and-pencil KSADS,[26] including mood disorders (MDD, persistent depression, mania, hypomania, cyclothymia, bipolar disorders, and disruptive mood dysregulation disorder), psychotic disorders (schizoaffective disorders, schizophrenia, schizophreniform disorder, brief

psychotic disorder), anxiety disorders (panic disorder, agoraphobia, separation anxiety disorder, simple phobia, social anxiety disorder, selective mutism, generalized anxiety disorder [GAD], obsessive-compulsive disorder), neurodevelopmental disorders (ADHD, autism spectrum disorder, transient tic disorder, Tourette's disorder, chronic motor or vocal tic disorder), behavioral disorders (conduct disorder [CD], ODD), eating and elimination disorders (enuresis, encopresis, anorexia nervosa, bulimia, binge eating disorder), trauma- or stressor-related disorders (PTSD, adjustment disorders), and alcohol use and substance use disorders as well as numerous other specified diagnoses when full criteria for these diagnoses are not met.

With the three versions of KSADS-COMP, a variety of reports are available to the clinicians in real time. The Symptoms/Comments Report provides a detailed listing of each symptom item administered and responses of the youth and caregiver to each item. All comments written throughout by the clinician, parent, or youth can also be printed using this report. This is useful for summarizing information about how individuals describe their symptoms (eg, "I feel like a volcano sometimes"), capturing information about specific events (eg, reports of adverse childhood experiences), and details about clinically significant behaviors (eg, suspensions). The Diagnosis Report provides current and past diagnoses; their associated *ICD-10* codes; a list of all threshold level symptoms; and information about whether the diagnosis is current, past, or in partial remission. The Diagnostic Report also provides a comprehensive list of all suicidality items and a rating according to the Columbia Classification Algorithm of Suicide Assessment (C-CASA),[27] as recommended for FDA clinical trials. Additional unique features of the clinician-administered and self-administered versions of the KSADS-COMP are described in "Methods."

This article describes two studies. The first study examined the validity of the clinician-administered version of the KSADS-COMP, and the second study examined the validity of the parent and youth self-administered versions of the KSADS-COMP.

METHOD: STUDY ONE: VALIDATION OF CLINICIAN-ADMINISTERED KSADS-COMP

Procedures

The sample for the initial validation study of the clinician-administered KSADS-COMP comprised participants from the Child Mind Institute Healthy Brain Network (HBN) initiative, which includes the clinician-administered KSADS-COMP and a number of other relevant clinical assessments in its standard assessment battery.[28] Subjects recruited for the HBN initiative before October 2018 who had the clinician-administered KSADS-COMP with both informants and all the relevant ratings scales were included in this report. HBN is a large-scale data collection effort (target N = 10,000) focused on the generation of an open resource for studying child and adolescent mental health (see HBN website at http://fcon_1000.projects.nitrc.org/indi/cmi_healthy_brain_network/index.html for details). A data sharing agreement was signed allowing for the sharing of de-identified data for the purposes of examining the validity of the KSADS-COMP, and the use of the de-identified data included in this article was approved by the Johns Hopkins Institutional Review Board.

Participants

A total of 511 English-speaking youth and parent dyads from the HBN initiative were assessed using the clinician-administered KSADS-COMP interview by two doctoral-level clinicians. According to the clinician-administered KSADS-COMP, 75 youths had no psychiatric diagnosis, with an overrepresentation of children with psychopathology contained in the community-based HBN cohort given incentives for recruitment, include free psychiatric and learning assessments and referrals for services when clinically indicated. The average age for the sample was 11.8 years (SD 2.7), and youths ranged in age from 6 to 18 years at the time of the interview. There were 307 boys (60%). Of the sample, 62% identified as white (N = 317), and 19.5% identified as Hispanic. Only 63% of caregivers reported income data that were scored categorically based on income earnings below and above $90,000, with 53% of those reporting income data above this threshold.

Measures

Clinician-Administered KSADS-COMP. The clinician-administered KSADS-COMP was administered to parent and youth participants by the same clinician. The parent interview was completed first if the youth was a preadolescent; the order was reversed if the youth was an adolescent. With the clinician-administered KSADS-COMP, as with the paper-and-pencil version of the KSADS, final diagnoses were based on consensus ratings integrating information derived from the parent and youth interviews. In general, greater weight is given to the youth's reports of internalizing symptoms and the caregiver's report of externalizing symptoms, although latitude in clinical judgment is allowed.

In addition to having the three primary components of the paper-and-pencil KSADS discussed in the introduction (the unstructured introductory interview, the screen interview, and the diagnostic supplements), the clinician-administered KSADS-COMP includes computerized youth and parent

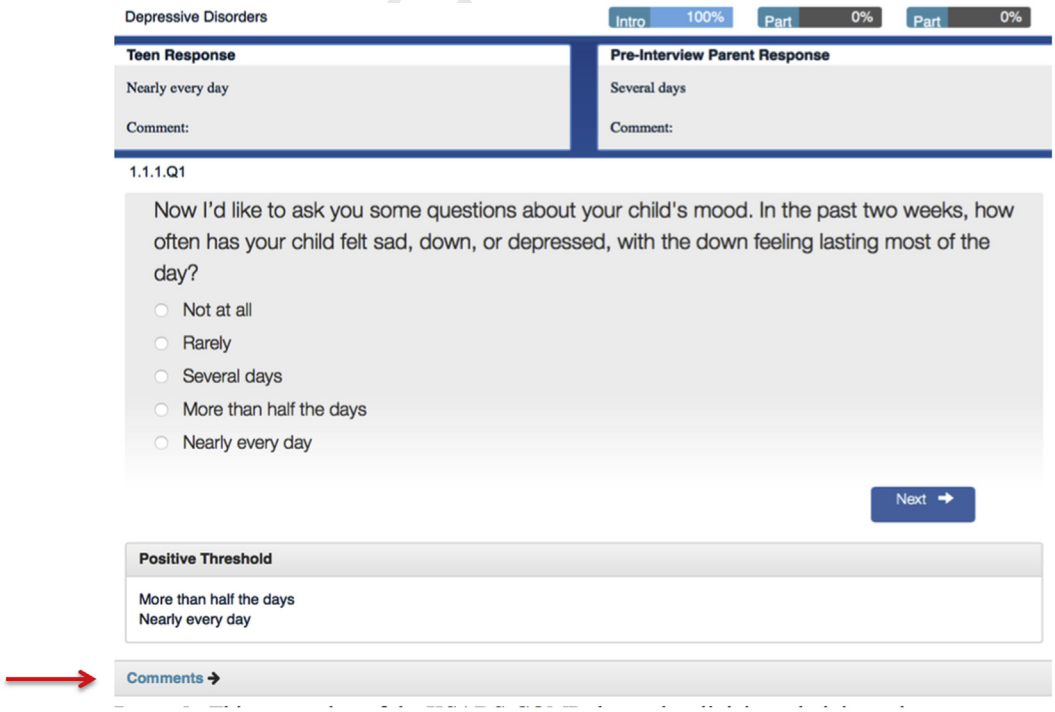
FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

preinterview self-report ratings of the screen interview items to streamline the administration of the clinical interview. Figure 1 depicts a screenshot of the clinician-administered KSADS-COMP interface. The figure shows the screen that appears when the clinician is administering the parent interview. The screenshot shows the youth's interview response in the upper left corner, the parent's preinterview response in the upper right corner, and the clinician's response options in the center of the screen. All symptoms in the KSADS-COMP are initially surveyed for severity over the past 2 weeks. If a threshold level response is provided, the KSADS-COMP interview progresses to inquire about the next symptom; if a subthreshold response is given, the interviewer is prompted to inquire about the lifetime occurrence of the symptom, with the presence of past symptoms rated dichotomously. Threshold criteria are presented below the response options, allowing the clinician to determine what responses will be above and below threshold for that symptom. In addition, as highlighted by the red arrow on the screen, there is also a Comments dropdown option associated with each item that allows clinicians to write notes throughout the interview.

The instructions for the clinician-administered KSADS-COMP are similar to the instructions for the paper-and-pencil KSADS. The KSADS-COMP is likewise a semistructured instrument and designed to be administered in a conversational style. Whereas fewer sample probes are included in the computer version, clinicians are told they do not need to recite the probes verbatim, that they are free to make stylistic changes and incorporate language generated by the parent or youth when conducting the interview, and that they need only ask as many questions as is necessary to score each item. In addition, information learned in the unstructured introductory interview can be used to further probe individual items.

Current threshold level and past "ever" responses will trigger the supplement for a given disorder to appear at the bottom of the dashboard. As in the paper-and-pencil version of the KSADS, the supplements include the necessary follow-up questions to determine if diagnostic criteria for the disorder are met, if more than one episode of the disorder was experienced, and if the current disorder is in partial remission.

FIGURE 1 Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version (KSADS-COMP) Screenshot—Clinician-Administered Interview Interface



Note: *This screenshot of the KSADS-COMP shows the clinician-administered parent interview screen with teen interview responses in the upper left corner and parent preinterview self-report ratings in the upper right corner. The availability of these data help to streamline the diagnostic interview. The red arrow calls attention to the comments section, which can be expanded if the clinician wishes to make notes in response to this item. See the text for a more complete description of this screenshot and the KSADS-COMP.*

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

Figure 2 shows a screenshot of the diagnostic dashboard of the clinician-administered KSADS-COMP and highlights several additional features of the user interface. The diagnostic interview dashboard appears once the unstructured introductory interview of the KSADS-COMP has been completed. The screen modules are shown in the top two thirds of the figure. Screening modules that have not been administered appear in green; completed modules appear in gray. Thus, clinicians can determine at a glance the screen modules that have and have not been completed. The bottom third of the figure depicts the supplement modules that should be completed because threshold level responses were given in the screen interview, alleviating the need for clinicians to track which supplements should be administered after the screen interview is completed. All modules of the KSADS-COMP do not need to be administered; there is a "choose as you go" option for clinicians. For example, if a clinician has prior diagnostic information for a youth and wishes to assess for only a specific disorder or if the preinterview ratings completed by the parent and youth suggest the likely presence of just one disorder, that one module can be selected independently of the other diagnostic modules. This feature greatly enhances the efficiency and versatility of the clinician-administered KSADS-COMP for application in a variety of clinical settings.

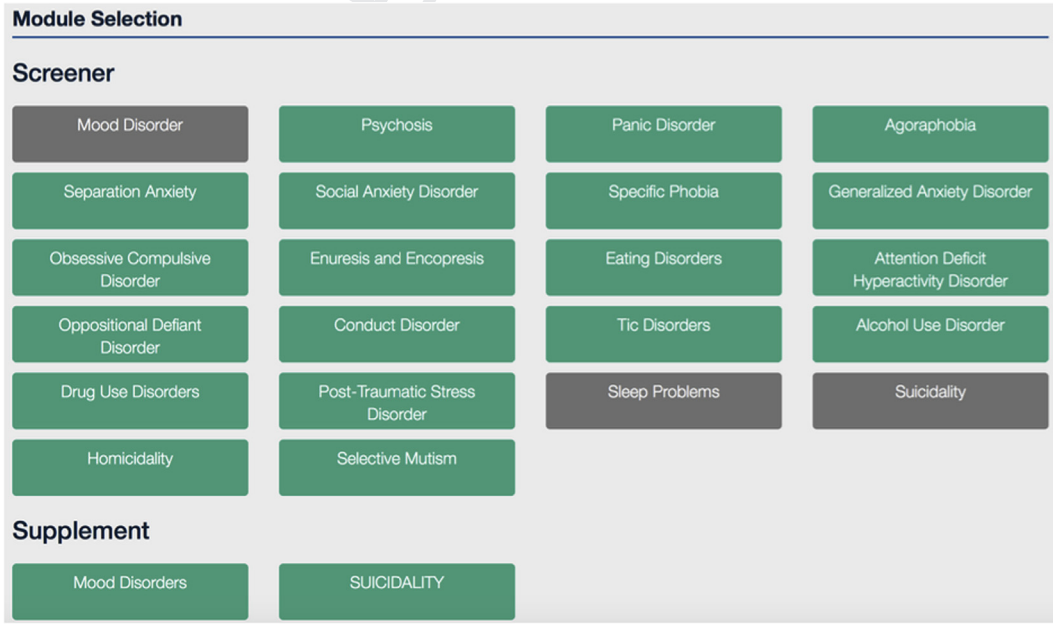
Validation Measures. The measures used to validate the diagnoses generated with the clinician-administered KSADS-COMP are identical (eg, Child Behavior Checklist, Screen for Child Anxiety and Related Emotional Disorders) or comparable (eg, Child Depression Inventory vs. Mood and Feelings Questionnaire) to the measures used to validate the paper-and-pencil KSADS.[1]

The Mood and Feelings Questionnaire (MFQ) (long form) is a 33-item (child report) or 34-item (parent report) well-validated scale that measures depressive symptoms in youths 6 to 17 years of age, with individual items rated on a 0 ("Not true") to 2 ("True") point rating scale.[29-33] MFQ total scores were used in the current report to validate clinician-administered KSADS-COMP depressive disorder diagnoses.

The Screen for Child Anxiety Related Emotional Disorders (SCARED) is a 41-item instrument that measures anxiety disorder symptoms in children and adolescents via youth and parent report using a point rating scale (0–2).[34-36] The parent and youth SCARED Total Score and GAD scale scores were used in the current report for analytic purposes.

The Child Behavior Checklist (CBCL) is one of the most widely used instruments for measuring behavioral and emotional psychopathology in youths.[37-39] The Attention

FIGURE 2 Clinician-Administered Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version (KSADS-COMP) Dashboard—Screen Modules and Activated Supplements



Note: *This screenshot shows the dashboard of the clinician-administered KSADS-COMP interview. The dashboard appears once the unstructured introductory interview is completed. All the screen interview modules are depicted on the top two thirds, and a sample of activated supplements are depicted below. See the text for a more complete description of this screenshot.*

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

Problem, Rule Breaking, and Aggressive Behavior standardized scale scores were used in the current report to validate behavioral diagnoses generated with the clinician-administered KSADS-COMP.

Data Analyses

Univariate descriptive statistics were calculated to characterize study participants and to evaluate the frequencies of *DSM-5* current and lifetime diagnoses generated with the KSADS-COMP. Current diagnoses included current and partially remitted episodes of disorders. For analytic purposes, four diagnostic categories were generated for youths who met criteria for the following current disorders: any depressive disorders, any anxiety disorders, ADHD, and ODD or CD. To assess convergent validity of the categorical diagnoses generated with the clinician-administered KSADS-COMP, Wilcoxon rank sum tests were used. Youths who met current criteria for a particular category of disorder were compared with youths with no lifetime history of a disorder in that category on the measures assessing symptoms of that disorder. Nonparametric statistics were used given that the outcome measures were non–normally distributed. Spearman rank correlation coefficients were also calculated to evaluate the associations between the standardized symptom measures (MFQ, SCARED, and CBCL subscales) and the KSADS-COMP dimensional rating scales associated with these disorders; Table S1 (available online) lists items included in each KSADS-COMP diagnostic-specific dimensional rating scale examined in this report.

RESULTS: STUDY ONE: VALIDATION OF CLINICIAN-ADMINISTERED KSADS-COMP

Clinician-Administered KSADS-COMP Current and Lifetime Diagnoses

Rates of current diagnoses are depicted in Table 1. Lifetime rates of diagnoses were as follows. A total of 66 (13%) youths met criteria for a lifetime depressive disorder; diagnoses included MDD (n = 45), persistent depressive disorder (n = 6), and other specified depressive disorder (n = 17). A total of 213 (42%) youths met criteria for a lifetime anxiety disorder, including panic disorder (n = 4), other specified panic disorder (n = 8), agoraphobia (n = 18), separation anxiety (n = 52), other specified separation anxiety disorder (n = 15), social anxiety (n = 81), specific phobia (n = 80), GAD (n = 92), other specified GAD (n = 6), obsessive-compulsive disorder (n = 36), and other specified obsessive-compulsive disorder (n = 1). A total of 339 (66%) youths met criteria for a lifetime ADHD diagnosis. Of these, 278 youths met full criteria for current ADHD, 11 met criteria for ADHD in partial remission, 24 met criteria for other specified ADHD, and 26 met criteria for past ADHD. A total of 99 (19%) youths met criteria for a lifetime ODD, and 21 youths (4%) met lifetime criteria for CD (16 childhood onset and 5 adolescent onset). Frequencies for the other disorders assessed with the KSADS-COMP were much lower than the above-described depressive, anxiety, and behavior disorders and are not presented here.

Convergent Validity Data

Table 1 presents the means and standard deviations for youth and parent reports on the MFQ, SCARED, and CBCL subscales for youths with a current diagnosis of a particular category of disorder and youths with no lifetime history of a disorder in that category. Youths with a current diagnosis differed significantly from youths without a history of that given disorder on all standardized scales ($p < .0001$, all analyses).

Correlations Between Standardized Clinical Rating Scales and Clinician-Administered KSADS-COMP Dimensional Scales and Associations Between Clinician-Administered KSADS-COMP Dimensional Scales and Diagnostic Group Assignment

As noted previously, Table S1 (available online) lists items included in each of the KSADS-COMP diagnostic-specific dimensional rating scales examined in this report. The dimensional scales for these analyses were derived from the consensus ratings that integrated parent and youth reports. The KSADS-COMP 3-item depression scale derived from the consensus ratings correlated significantly with the youth ($r_S = .25$, $p < .001$) and parent ($r_S = .40$, $p < .001$) MFQ scores; the KSADS-COMP 1-item GAD consensus ratings scale correlated significantly with the youth ($r_S = .33$, $p < .001$) and parent ($r_S = .43$, $p < .001$) total SCARED scores and the youth ($r_S = .37$, $p < .001$) and parent ($r_S = .45$, $p < .001$) SCARED GAD subscale scores; the KSADS-COMP 4-item consensus ADHD scale correlated significantly with the CBCL Attention Problem subscale ($r_S = .59$, $p < .001$); and the KSADS-COMP 2-item ODD consensus ratings scale correlated significantly with the CBCL rule breaking ($r_S = .56$, $p < .001$) and aggressive behavior ($r_S = .61$, $p < .001$) subscales. Table S2 (available online) provides means and standard deviations for the clinician-administered KSADS-COMP dimensional scales for each diagnostic group. For each disorder, youths with a positive current diagnosis scored significantly higher on the corresponding dimensional scale than youths who did not meet criteria for that diagnosis, suggesting the clinical utility of the screen items included in the scales.

TABLE 1 Criterion Validity Data for Clinician-Administered Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version Current Diagnostic Groups on Standard Clinical Measures (N = 511)

DSM-5 Current Diagnoses	Standardized Measure	Diagnosis Positive, Mean (SD)	Diagnosis Negative, Mean (SD)	*Z* and *p*
Depressive disorders (n = 26)	MFQ-C	30.69 (18.25)	12.61 (9.64)	$Z = -5.32$; $p < .0001$
	MFQ-P	23.27 (12.48)	8.43 (8.18)	$Z = -5.89$; $p < .0001$
Anxiety disorders (n = 158)	SCARED-C total score	31.71 (19.08)	20.63 (15.06)	$Z = -6.15$; $p < .0001$
	SCARED-P total score	23.16 (13.17)	10.30 (8.48)	$Z = -10.46$; $p < .0001$
ADHD (n = 313)	CBCL attention problems	66.53 (9.73)	56.07 (7.31)	$Z = -12.12$; $p < .0001$
ODD/CD (n = 78)	CBCL rule breaking	63.81 (7.56)	54.61 (6.00)	$Z = -9.36$; $p < .0001$
	CBCL aggressive behavior	68.41 (8.93)	55.66 (7.14)	$Z = -10.55$; $p < .0001$

Note: Youths with positive current diagnoses scored greater than youths without positive diagnoses on each of the standard clinical rating scales, providing convergent validity of the diagnoses generated with the clinician-administered KSADS-COMP. Wilcoxon rank sum tests were used to evaluate the differences between KSADS-COMP positive and negative diagnostic groups on the standardized measures. Boldface indicates significant results. ADHD = attention-deficit/hyperactivity disorder (cutoff score = 65); C = Child; CBCL = Child Behavior Checklist; KSADS-COMP = Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version; MFQ = Mood and Feelings Questionnaire (cutoff score = 27); ODD/CD = oppositional defiant disorder/conduct disorder (cutoff score = 65); P = Parent; SCARED = Screen for Child Anxiety Related Emotional Disorders (cutoff score = 25).

METHOD: STUDY TWO: VALIDATION OF PARENT AND YOUTH SELF-ADMINISTERED KSADS-COMPS

Participants

A total of 158 youth and parent dyads were recruited from three university and clinical sites to validate the self-administered KSADS-COMPs: Kennedy Krieger Institute (KKI) and other Johns Hopkins child and adolescent psychiatry mental health programs (n = 39), Western Psychiatric Institute and Clinic (WPIC) at University of Pittsburgh Medical Center (n = 71), and the Child Mind Institute (CMI) (n = 48), with all the youths from CMI who participated in the validation of the self-administered KSADS-COMP also participants in study one, the validation of the clinician-administered KSADS-COMP. A subset of 106 youths who completed the self-administered KSADS-COMP also completed a second research visit to complete the clinician-administered KSADS-COMP (see "Procedures" below regarding selection criteria for completing the second assessment). Inclusion criteria across the sites were 1) 11 to 17 years of age, 2) parent available and willing to participate in the research, and 3) fluent in English. At the KKI and Johns Hopkins sites, all participants were required to be receiving mental health services for study participation; at WPIC, normal controls were recruited from the offspring of healthy controls participating in the Bipolar Offspring Study (BIOS) (n = 30; grant MH060952; PI: B.B.), and youths with psychopathology were recruited from the BIOS study and WPIC outpatient clinics; and at CMI, subjects were recruited from a pool of youths consenting for the HBN initiative who also agreed to participate in the KSADS-COMP study.

Subject Characteristics

A total of 158 adolescents (n = 82 [52%] boys, n = 76 [48%] girls) and their parents completed the self-administered KSADS-COMPs. The mean age of youths was 13.8 years (SD 1.7). The sample was 54% white (n = 86); 31% African American (n = 49); 8% Hispanic or Latino (n = 13); 1% each for American Indian or Alaskan Native (n = 1), Asian (n = 1), and Native Hawaiian or other Pacific Islander (n = 2); and 3% other (n = 5) (note percentages equal more than 100%, as subjects could choose more than one racial identity). Of youths, 92% were living with a biological parent. The subset of 106 youths who also completed the clinician-administered KSADS-COMP had an average age of 13.7 years (1.7); exactly 50% of the subsample (n = 53) was male, and 65% (n = 69) were white.

Procedures

Given the well-documented tendency for informants to attenuate symptom reports on retest,[40] to avoid systematic bias in results examining the concordance between the self-administered and clinician-administered KSADS-COMP, at the first study visit half the subjects were randomly assigned to complete the adolescent and parent self-administered KSADS-COMP, and half the subjects were randomly assigned to complete the clinician-administered KSADS-COMP. Only subjects who met criteria for MDD, a bipolar diagnosis, ADHD, ODD or CD, PTSD,

a substance use disorder, or no lifetime diagnoses during the first assessment were invited for a second study visit to complete the alternate (eg, self-report vs. clinician-administered) version of the KSADS-COMP. Among the youths included in the reassessment sample, 53% (56 of 106) completed the self-administered version of the KSADS-COMP at the initial assessment. The standardized clinical assessment measures were completed at the conclusion of the first study visit, after completion of either the self-administered or clinician-administered KSADS-COMP. Parents and youths were each compensated $50 for completion of the first KSADS-COMP assessments, and each received an additional $75 if invited back to complete the second interview. Compensation for travel was also provided.

When completed second, the clinician-administered KSADS-COMP assessments were conducted blinded to initial self-administered KSADS-COMP diagnoses and all standardized clinical assessment measures completed during the first visit. The second KSADS was completed within 3 weeks of the initial assessment for 98% of the cases (mean duration between KSADS-COMP assessments: 9.78 days; SD 6.33; range, 1–39 days). All study procedures received approval by the Institutional Review Boards at each of the participating sites.

Measures

Self-Administered KSADS-COMP. The self-administered versions of the KSADS-COMP are designed for youths age 11 and older. Similar to the clinician-administered KSADS-COMP, the self-administered versions of the instrument contain the same three primary components of the paper-and-pencil KSADS, the introductory interview, the screening interview that evaluates key symptoms from each of the disorders covered in the KSADS, and supplements that are administered for each diagnosis with above threshold scores on the screening items of that diagnosis, in order to thoroughly evaluate the disorders according to *DSM-5* criteria. The youth and parent self-report versions are administered to each informant separately. The self-administered KSADS-COMP can be completed on-site or remotely, but was completed on-site for the current investigation.

The self-administered KSADS-COMP was designed to emulate the probing done by a trained clinician. As such, it contains the same probes, response options, and scoring and branching logic as the clinician-administered KSADS-COMP. For example, if a child endorsed long-standing difficulties with inattention and ADHD symptoms and endorsed difficulties with concentration when completing the depression supplement, the child would be presented with a question that asks whether the concentration difficulties got worse with the onset of the depressed mood. As another example of how the instrument was designed to emulate the probing done by a trained clinician, if the child endorsed a history of bullying and paranoid thoughts that others are out to get them, a question would be asked to determine if the child feels it is just those who have been bullying them that are out to get them or if the paranoid ideation is more pervasive.

The parent version of the KSADS-COMP is just text-based. Questions in the youth self-report version are administered with prerecorded video clips to facilitate administration, and youths can choose a male (K.K.) or female (J.K.) interviewer; Figure S1 (available online) shows a screenshot of the youth report self-administered KSADS-COMP. Youths also have the option to turn off the video clips and simply read the probes. Parents and youths have the ability to add comments at any time to clarify their answers by either typing in or, with tablets, writing in with a stylus.

There is a suicide and homicide alert system that contacts the clinician via text or e-mail if a respondent reports suicidal or homicidal ideation when completing the self-administered KSADS-COMP and an option to omit these items if the interview is being administered without a clinician on-site. Reports for the self-administered KSADS-COMP are likewise available to the clinician immediately, listing the diagnoses for which the youth met criteria; the symptoms endorsed, including homicidality and suicidality items; C-CASA ratings; and all notes written in the comments sections.

Clinician-Administered KSADS-COMP. As described under "Method" for study one, the clinician-administered KSADS-COMP is a computerized diagnostic interview derived from the paper-and-pencil KSADS. All interviewers for study two were licensed clinicians with extensive experience administering the paper-and-pencil KSADS who received a didactic training session by one of the authors (J.K.) on the administration of the KSADS-COMP and had the opportunity to experiment with the computer program before the initiation of the investigation. To establish interrater reliability across sites, the eight assessors (eg, two at CMI, four at UPMC, two at KKI) scored all the screen items on two mock patient interviews that were video recorded, with parent and youth preinterview ratings available to assessors during the administration. On the first interview, all eight raters scored 94% (154 of 163) of the items identically, and the eight raters agreed if the items were at or above the clinical threshold for 97.5% (159 of 163) of the items. In rating the second interview, all eight

raters scored 96% (154 of 160) of the items identically, and the eight raters agreed if the items were at or above the clinical threshold for 98% (157 of 160) of the items. Although diagnostic concordance was not determined, as diagnoses are computer generated based on scores of individual KSADS-COMP items, diagnostic concordance would thus be expected to be comparably high.

System Usability Scale. User satisfaction with the technical aspects of the self-report versions of the KSADS-COMP was assessed using the System Usability Scale (SUS).[41,42] The SUS is a well-validated scale for assessing usability across diverse types of user interfaces (eg, tablet, desktop, interactive voice response, cell phone), with good internal consistency reliability (coefficient $\alpha = .91$).[43] The SUS contains 10 items covering different aspects of the user's experience with the technology (eg, "I thought the computer interview was easy to use"; "The features of the computer interview were too complex"; "I would take a computer interview designed like this again"). Each item is rated on a 5-point scale, with anchor descriptions provided for the endpoints (1 = strongly disagree, 5 = strongly agree). A global rating of user-friendliness is also obtained.

User Satisfaction Questionnaire. The User Satisfaction Questionnaire has been used in prior studies to assess satisfaction with computer-administered versions of mental health assessments (see scale items listed in Table 2).[44] Users rated their experience on a 4-point scale (strongly agree, agree, disagree, strongly disagree) and were asked if they would be willing to be interviewed with the self-report KSADS-COMP again and whether they preferred to be asked these types of questions by computer or clinician or if they had no preference.

Patient Health Questionnaire. The 9-item Patient Health Questionnaire (PHQ-9) is a scale designed to measure key symptoms of depression. Initially developed to screen for depressive disorder among adults in primary care,[45] the scale has also demonstrated good psychometric properties among adolescents.[46] Response options range from 0 (not at all) to 3 (nearly every day).

Brief Child Mania Rating Scale Parent and Child Report. The 10-item Brief Child Mania Rating Scale (BCMS) was used in the current report; the BCMS demonstrates similar psychometric properties and performance as the long version of the Child Mania Rating Scale.[47] Response options range from 0 (never/rare) to 3 (very often). The original 21-item Child Mania Rating Scale scale was designed to measure symptoms of bipolar spectrum illness. It has good psychometric properties and reliably distinguishes between symptoms of bipolar disorder, characteristics of ADHD, and ratings of normal controls.[48]

GAD Scale. The 7-item GAD-7 youth report instrument is designed to measure key symptoms of GAD. Response options range from 0 (not at all) to 3 (nearly every day).[49]

Strengths and Weaknesses of ADHD Symptoms and Normal Behavior Scale (SWAN). The Strengths and Weaknesses of ADHD Symptoms and Normal Behavior Scale (SWAN) was designed to measure parent-reported symptoms of ADHD (18 items) and ODD (12 items).[50] Items are positively worded in order to measure youths' strengths as well as weaknesses. For example, parents are asked, "Compared to other children, how does your child do the following: …" and "give close attention to detail and avoid careless mistakes." Response options for the scale allow for scoring of strengths and weaknesses and range from −3 (far above average) to 3 (far below average).

Primary Care PTSD Screen. The Primary Care PTSD screen is a 4-item instrument with dichotomized response options (yes/no) of core PTSD *DSM-5* symptoms that was developed for adults, but has been shown to be an effective screening tool in adolescents as well.[51,52] One point is assigned for each "yes" answer.

Data Analyses

Univariate statistics were used to examine demographic characteristics, examine responses to the user satisfaction scales, and describe the frequencies of selected diagnoses. Bivariate statistics examined associations between selected diagnostic groups attained on the parent and youth self-report interviews and the standardized assessment instruments and KSADS-COMP dimensional rating scales. Given that most of the outcome measures were non–normally distributed, nonparametric statistics were used to examine differences between diagnostic groups and associations between scales. Percent agreement, Cohen's κ,[53] and Gwet's first-order agreement coefficient (AC1) statistics[54] were calculated to examine concordance between parent and youth self-report and clinician-generated diagnoses for selected current psychiatric disorders, with both Cohen's κ and Gwet's AC1 statistics calculated, as Gwet's AC1 is less affected by prevalence and marginal probability than Cohen's κ.[53-55]

Given the expected and observed high rates of informant variance, multinomial logistic regression analyses were conducted to derive weights for integrating parent and youth data from the self-administered KSADS-COMP to predict diagnoses derived from the clinician-administered KSADS-COMP, with the items selected for entry in the regression models from the self-administered KSADS-COMP data

TABLE 2 Satisfaction Ratings With Self-Administered KSADS-COMP

	Youth Responses		Parents Responses	
Item	Mean (SD)	Percent Agree or Strongly Agree	Mean (SD)	Percent Agree or Strongly Agree
1. I was comfortable answering questions on the computer	3.3 (0.7)	91%	3.6 (0.5)	99%
2. The questions were clearly stated and understandable	3.2 (0.9)	85%	3.5 (0.6)	94%
3. The computer did a good job asking me about my feelings	3.2 (0.7)	90%	3.4 (0.6)	96%
4. I felt less embarrassed answering these questions on the computer than I would have with a clinician	2.8 (1.0)	71%	2.6 (1.0)	54%
5. I found the computer interview to be a helpful process to go through	3.2 (0.7)	89%	3.4 (0.6)	96%

Note: Overall, both parents and youths felt comfortable answering the questions via computer, found the questions clearly stated, and found the interview a helpful process. Satisfaction rating scale: 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree. KSADS-COMP = Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version.

generated by the clinical experience of the investigators. Receiver operating characteristic curve analyses were then conducted to determine the accuracy of the multinomial logistic models generated using the self-administered KSADS-COMP data in predicting clinician-derived diagnoses.

RESULTS: STUDY TWO: VALIDATION OF PARENT AND YOUTH SELF-ADMINISTERED VERSIONS OF KSADS-COMP

Administration Time Self-Administered and Clinician-Administered KSADS-COMP

The mean (SD) interview duration times for the parent and youth self-report KSADS-COMP were 63.15 (38.3) minutes and 50.92 (28.0) minutes, respectively. The self-administered KSADS-COMP was completed by 81% of the parents and 90% of the youths within 90 minutes. The parent and youth portions of the clinician-administered KSADS-COMP had mean (SD) duration times of 50.3 (29.9) minutes and 41.5 (28.5) minutes, respectively, with the combined parent and youth clinician-administered KSADS-COMP completed in less than 1 hour for 31% of the dyads, less than 90 minutes for 59.4% of the dyads, less than 2 hours for 75.5% of the dyads, and less than 3 hours for 95.3% of the dyads.

User Satisfaction

Both youths and parents expressed high satisfaction with the technical features of the self-administered KSADS-COMP; on the SUS, the mean parent rating was 90.0 (corresponding to "best possible"), and the mean youth rating was 81.7 (between "good" and "excellent"). Similarly, the global rating of "user friendliness" of the technology was high: 5.5 (SD 1.2) for adolescents and 5.8 (SD 0.7) for parents (7-point scale: 1 = worst possible, 2 = awful, 3 = poor, 4 = OK, 5 = good, 6 = excellent, 7 = best imaginable). Ratings of parent and youth satisfaction with the KSADS-COMP are presented in Table 2. Overall, both parents and youths felt comfortable answering the questions via computer, found the questions clearly stated, and found the interview a helpful process. Among the youths, 85% stated they were willing to be interviewed by computer again, and when asked if they would prefer to be asked these types of questions by computer or clinician after completing the self-administered KSADS-COMP, 54% said computer, 11% said clinician, and 35% had no preference. Among the parents, 99% (n = 132) said they would be willing to be interviewed again by computer. In terms of interview preference, 28% of the parents stated they preferred the computer, 22% stated they preferred a clinician, and 50% had no preference.

Convergent Validity Data

Table 3 presents the means and standard deviations for youth and parent report on the PHQ-9, BCMS, GAD-7, SWAN (ADHD and ODD), and PTSD measures for youths who did and did not meet criteria for the corresponding current diagnoses generated by youth and parent

report on the self-administered KSADS-COMP. Wilcoxon signed rank tests indicated that for all these disorders, youths who generated a positive diagnosis by parent report scored significantly higher on the corresponding symptom measure than youths who were not rated by their parents as having that diagnosis. The same pattern emerged for youth-generated diagnoses except for youth report of ODD.

Associations Between Self-Report KSADS-COMP Dimensional Scales and Diagnostic Group Assignment and Correlations Between KSADS-COMP Dimensional Scales With Standardized Measures

Table S3 (available online) provides means and standard deviations for the KSADS-COMP dimensional scales by diagnostic group assignment. For each disorder, youths with a positive current diagnosis scored significantly higher on the corresponding dimensional scale than youths who did not meet lifetime criteria for that diagnosis. All comparisons were statistically significant for parent-rated and youth-rated diagnoses. As depicted in Table 4, all KSADS-COMP youth-generated and parent-generated dimensional rating scales were also significantly positively associated with their corresponding same informant standardized measure. Table S4 (available online) presents correlations between clinician-administered and youth and parent self-administered KSADS-COMP diagnostic specific dimensional rating scales, which likewise showed significant correlations.

Diagnostic Concordance Among Informants

Table 5 depicts the concordance between informants. As indicated in the "Percent Negative Agreement" column in the table, agreement between informants was greatest when a diagnosis was not present. Concordance was lower in rating the presence of each diagnosis, with the highest concordance between informants found in diagnosing ADHD. Gwet's AC1 concordance ratings between diagnoses generated using the parent and youth self-administered KSADS-COMP ranged from 0.76 to 0.89; Gwet's AC1 concordance ratings between diagnoses generated using the clinician and youth self-administered KSADS-COMP ranged from 0.80 to 0.91,

TABLE 3 Scores on Standardized Clinical Measures by Current Diagnostic Groups Determined by Youth and Parent Report on Self-Administered KSADS-COMP

	Never, Mean (SD)	Current, Mean (SD)	*Z*	*p*
Major depressive disorder (PHQ-9)				
Youth diagnosis	3.59 (5.35) (n = 96)	7.65 (6.06) (n = 20)	−3.904	.01
Parent diagnosis	3.80 (5.45) (n = 88)	6.38 (5.03) (n = 21)	−2.770	.01
Bipolar 1 or 2 (BCMS)				
Youth diagnosis	3.81 (4.39) (n = 113)	8.35 (6.38) (n = 20)	−3.56	.01
Parent diagnosis	2.35 (3.48) (n = 124)	6.20 (3.77) (n = 15)	−3.61	.01
Anxiety disorder (GAD-7)				
Youth diagnosis	1.82 (2.91) (n = 82)	12.40 (5.44) (n = 10)	−4.951	.01
Parent diagnosis	2.83 (4.89) (n = 77)	6.13 (4.85) (n = 15)	−3.394	.01
ADHD (SWAN—parent report)				
Youth diagnosis	9.59 (11.96) (n = 87)	14.69 (9.58) (n = 29)	−2.929	.01
Parent diagnosis	3.75 (6.05) (n = 72)	21.67 (9.65) (n = 48)	−8.33	.001
ODD (SWAN—parent report)				
Youth diagnosis	8.24 (8.97) (n = 102)	11.59 (9.09) (n = 17)	−1.50	.13
Parent diagnosis	3.77 (5.54) (n = 74)	16.29 (8.26) (n = 49)	−7.61	.001
PTSD (PTSD-PC)				
Youth diagnosis	.58 (1.03) (n = 106)	3.08 (1.26) (n = 13)	−5.44	.001
Parent diagnosis	.81 (1.25) (n = 101)	2.40 (1.34) (n = 5)	−2.77	.01

Note: Youths with positive diagnoses scored greater than youths without positive diagnoses on each of the standard clinical rating scales, providing convergent validity of the diagnoses generated with the self-administered KSADS-COMP. Youths who generated ODD diagnoses was the only exception to this pattern of findings. Wilcoxon rank sum tests evaluated differences between KSADS-COMP negative and positive groups on the standardized measures (PHQ-9, BCMS, GAD-7, SWAN, and PTSD scale.). The "Youth diagnosis" row represents diagnostic groups generated by youth self-report on the KSADS-COMP. The "Parent diagnosis" row represents diagnostic groups generated by parents. ADHD = attention-deficit/hyperactivity disorder; BCMS = Brief Child Mania Rating Scale; GAD-7 = 7-item Generalized Anxiety Disorder Scale; KSADS-COMP = Self-Administered Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version; ODD = oppositional defiance disorder; PC-PTSD-5 = Primary Care Screen for Posttraumatic Stress Disorder, DSM-5 version; PHQ-9 = 9-item Patient Health Questionnaire; SWAN = Strengths and Weakness of ADHD Symptoms and Normal Behavior–parent report.

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

TABLE 4 Spearman Rank Correlations Between KSADS-COMP Self-Report Dimensional Scales and Standardized Symptom Measures

KSADS Depression Scale (3 items)	PHQ-9 (9 items)
Youth self-report	.56**
KSADS Bipolar Scale (3 items)	BCMS (10 items)
Youth self-report	.55**
Parent report	.61**
KSADS GAD Scale (1 item)	GAD-7 (7 items)
Youth self-report	.51**
KSADS ADHD Scale (4 items)	SWAN (18 items)
Parent report	.76**
KSADS ODD Scale (2 items)	SWAN-ODD (12-items)
Parent diagnosis	.73**
KSADS PTSD Scale (3 items)	PTSD-PC Total (4 items)
Youth self-report	.56**

Note: The brief self-administered KSADS-COMP diagnostic specific rating scales correlated significantly with all standard clinical rating scales examined. ADHD = attention-deficit/hyperactivity disorder; BCMS = Brief Child Mania Rating Scale; GAD = generalized anxiety disorder; GAD-7 = 7-item Generalized Anxiety Disorder Scale; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; KSADS-COMP = Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version; PC-PTSD-5 = Primary Care Screen for Post-traumatic Stress Disorder, DSM-5 version; PHQ-9 = 9-item Patient Health Questionnaire; SWAN = Strengths and Weakness of ADHD Symptoms and Normal Behavior–parent report; SWAN-ODD = Strengths and Weaknesses of ADHD symptoms and Normal Behavior, Oppositional Defiant Symptoms–parent report.

**$p < .01$.

and Gwet's AC1 concordance ratings between diagnoses generated using the clinician and parent self-administered KSADS-COMP ranged from 0.86 to 0.94. The κ values were consistently lower for all comparisons.

Predicting Clinician-Derived Diagnoses Using Youth and Parent Self-Administered KSADS-COMP Data

The parent and youth self-administered KSADS-COMP items used to predict clinician-administered KSADS-COMP diagnoses are depicted in Table 6, together with the results of the receiver operating characteristic curve analyses conducted to determine the accuracy of the prediction models. Overall good to excellent concordance was achieved between diagnoses derived using the self-administered and clinician-administered KSADS-COMP when parent and youth self-administered KSADS-COMP data were integrated.[56]

DISCUSSION

Results from this initial validity study of the clinician-administered and self-administered versions of the KSADS-COMP are promising. As evidence of convergent validity, youths with current KSADS-COMP–generated mood, anxiety, ADHD, and ODD and CD diagnoses scored significantly higher on the relevant standardized measure for the particular diagnosis than youths without that diagnosis. The validity of the brief dimensional measures constructed from KSADS-COMP screen items was also supported by significant differences on the scales between diagnosis-positive and diagnosis-negative groups. There were also significant correlations between the brief KSADS-COMP dimensional rating scales and established standardized clinical rating scales, which were higher when the informants on the measures were the same on the KSADS-COMP and standardized rating scales (Table 4). Longitudinal data collection will be required to determine if the brief KSADS-COMP diagnostic specific dimensional rating scales are useful in tracking treatment response and symptoms over time.

There are currently no plans to compare the paper-and-pencil version of the KSADS with the clinician-administered KSADS-COMP. Existing literature suggests that putting paper-and-pencil versions of clinician-administered diagnostic interviews on an electronic platform improves reliability and validity substantially by reducing missing data and eliminating human error in branching and choosing appropriate interview questions.[23] In addition, clinician tallying when using paper-and-pencil versions of structured interviews has been found to contribute to significant errors, and research has shown that computerized versions of structured diagnostic instruments exceed the psychometric performance of their paper-and-pencil counterparts.[24,25]

There are three primary limitations to the current investigation: the restriction of interrater reliability assessments to the items in the screen interview, restriction of the diagnoses present in the validation samples and the number of youths who met criteria for each of the diagnoses examined, and the somewhat extended period of time between self-administered and clinician-administered KSADS-COMP assessments. Despite these limitations, the move to an electronic format and the other modifications made to the KSADS offer many advantages over the paper-and-pencil version of the instrument.

For example, the clinician-administered KSADS-COMP addresses several limitations that have been noted previously with the paper-and-pencil version of the KSADS. One such limitation is that the interview can be excessively time-consuming.[3,57] The mean administration time for the combined parent and youth clinician-administered KSADS-COMP was 91.9 minutes, which is less time than has previously been reported for completing the paper-and-pencil version of the KSADS with only one informant.[58] Administration time is reduced and the assessment streamlined by the youth and parent self-administered

TABLE 5 Youth, Parent, and Clinician Concordance in Current Diagnoses (N = 106)

Parent and Youth Concordance

Current Diagnosis	Percent Agreement	Cohen's κ	Gwet's AC1	Parent Diagnosis Frequency	Youth Diagnosis Frequency	Percent Positive Agreement	Percent Negative Agreement
MDD	82	.31	.76	22	21	43	89
Bipolar spectrum	83	.16	.80	11	20	20	94
Social anxiety	91	.27	.89	12	7	43	93
GAD	86	.22	.84	16	11	36	91
OCD	63	.14	.38	28	52	29	85
ADHD	71	.32	.52	50	30	67	73
ODD	66	.14	.47	50	17	59	67
CD	81	.17	.76	18	18	28	89
PTSD	89	.06	.87	5	13	8	97
No diagnoses	73	.32	.56	41	35	NA	NA

Clinician and Youth Concordance

Current Diagnosis	Percent Agreement	Cohen's κ	Gwet's AC1	Clinician Frequency	Youth Report Frequency	Percent Positive Agreement	Percent Negative Agreement
MDD	87	.23	.84	8	21	25	95
Bipolar spectrum	84	.19	.80	7	20	19	96
Social anxiety	96	.65	.96	7	7	80	97
GAD	84	.18	.80	14	11	33	89
OCD	66	.15	.47	10	52	18	95
ADHD	72	.40	.41	46	30	79	69
ODD	75	.25	.62	31	17	67	76
CD	85	.12	.82	8	18	17	94
PTSD	92	.52	.91	6	13	42	99
No diagnoses	78	.49	.62	33	32	NA	NA

Clinician and Parent Concordance

Current Diagnosis	Percent Agreement	Cohen's κ	Gwet's AC1	Clinician Report Frequency	Parent Report Frequency	Percent Positive Agreement	Percent Negative Agreement
MDD	90	.42	.87	8	22	38	97
Bipolar spectrum	94	.54	.94	7	11	57	97
Social anxiety	94	.54	.94	7	12	57	97
GAD	89	.47	.86	14	16	58	93
OCD	82	.25	.77	10	28	26	94
ADHD	90	.79	.78	46	50	91	89
ODD	76	.48	.57	31	50	57	89
CD	89	.34	.86	8	18	33	96
PTSD	93	.19	.93	6	5	33	95
No diagnoses	88	.72	.78	33	34	NA	NA

Note: Consistent with prior research, considerable variability was noted across informants. Gwet's AC1 is considered the most reliable concordance statistic when the prevalence and marginal probability of diagnosis are low. AC1 = first-order agreement coefficient; ADHD = attention-deficit/hyperactivity disorder; Bipolar spectrum = bipolar 1, bipolar 2, and other specified bipolar disorder; CD = conduct disorder; GAD = generalized anxiety disorder; OCD = obsessive-compulsive disorder; ODD = oppositional defiant disorder; PTSD = posttraumatic stress disorder.

preinterview screen items, the automated branching and scoring, and the computer tracking of the supplements to be completed.

Another limitation of the paper-and-pencil KSADS was the need for extensive clinician training to establish interrater reliability given that each symptom on the paper-and-

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

TABLE 6 Predicting Clinician Current Diagnoses Using Youth and Parent Self-Administered KSADS-COMP Data (N = 106)

Depression	Bipolar Disorder	ADHD	ODD
Youth KSADS Depression Scale; youth report of suicidality; parent and youth adaptive functioning measures (eg, drop in grades, extracurricular activities, friendships); antidepressant medication	Youth report decreased need for sleep; youth report elation; family history of bipolar disorder; mood stabilizer or atypical antipsychotic; inpatient hospitalization	Parent KSADS ADHD Scale; age of ADHD onset; ADHD medication; GAD diagnosis	Parent KSADS ODD Scale; parent report of suspensions and detentions; GAD diagnosis; criterion A trauma history
AUC = 0.877 ($p < .001$)	AUC = 1.00 ($p < .001$)	AUC = 0.977 ($p < .001$)	AUC = 0.913 ($p < .001$)
Sensitivity = 0.94	Sensitivity = 1.00	Sensitivity = 0.92	Sensitivity = 0.92
Specificity = 0.67	Specificity = 1.00	Specificity = 0.91	Specificity = 0.91

Note: Multinomial logistic regression analyses were conducted to derive weights for integrating parent and youth data from the self-administered KSADS-COMP to predict diagnoses derived from the clinician-administered KSADS-COMP, with the items selected for entry in the regression models generated by the clinical experience of the investigators. Overall good to excellent concordance was achieved between diagnoses derived using the self-administered and clinician-administered KSADS-COMP when parent and youth self-administered KSADS-COMP data were integrated. AUC = area under the curve; ADHD=attention-deficit/hyperactivity disorder; GAD = generalized anxiety disorder; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; KSADS-COMP = Kiddie Schedule for Affective Disorders and Schizophrenia Computerized Version; ODD = oppositional defiant disorder.

pencil version of the KSADS was assessed using unique rating criteria. The uniform rating scale used to assess all current symptoms in the KSADS-COMP (eg, not at all, rarely, several days, more than half the days, and nearly every day) and the automated branching features of the KSADS-COMP reduce the need for such training, while still allowing clinicians the flexibility to use their clinical judgment in probing and rating symptoms. The uniform rating scale for assessing current symptoms likely also accounts for the excellent interrater reliability in scoring items.

There are multiple additional features that render the clinician-administered KSADS-COMP more feasible than its paper-and-pencil predecessor for routine clinical practice. For example, the "choose as you go" modular format of the KSADS-COMP allows clinicians to select a subset of modules of interest rather than completing the entire interview. The self-administered preinterview screen items of the clinician-administered KSADS-COMP can inform module selection, and the unstructured introductory interview provides an excellent initial assessment of adaptive functioning that lends greater confidence to the selection of the subset of modules to be administered as well as providing other relevant information needed for clinical reports (eg, family, school, treatment history). The availability of diagnostic reports in real time further addresses efficiency concerns and allows clinicians to provide meaningful feedback to children and families in a timely fashion.

When comparing youth-generated, parent-generated, and clinician-generated diagnoses derived with the self-administered and clinician-administered KSADS-COMPs, consistent with research findings in the field, there was a lack of strong concordance between informants, with the concordance observed in this investigation comparable to or better than that observed in prior studies.[59-62] Prior studies have reported parent-child κ values in diagnosing depressive disorders of 0.09 or less[61,62] compared with the κ value of 0.31 in diagnosing MDD observed in the current study. Parent-child concordance in rating the other major diagnoses was essentially comparable to that observed in prior investigations.[61,62] Diagnostic concordance between the parent and clinician were higher than between the parent and child across all diagnoses, with youth and clinician concordance highest for social anxiety and PTSD. Overall, agreement between informants on the self-administered and clinician-administered KSADS-COMP was highest when a diagnosis was not present.

Ultimately, in clinical practice in making treatment decisions, cross-informant variance needs to be reconciled and, to date, relies on clinical judgment to do this. The receiver operating characteristic curve analyses reported in this article provide proof of concept that parent and youth data from the self-administered KSADS-COMP can be integrated and used to derive diagnoses with good to excellent concordance with clinician-derived diagnoses. However, further refinement, replication, and validation of the models used to integrate parent and youth self-report data to generate diagnoses similar to clinician-derived diagnoses are required in larger scale representative samples. At the present time, in treatment settings, such as busy emergency departments, the diagnostic information attained with the self-report KSADS-COMP can best be used to expedite evaluations and help clinicians finalize diagnostic impressions.

FLA 5.6.0 DTD ■ JAAC2574_proof ■ 14 June 2019 ■ 7:26 pm ■ ce

Whereas there are validated internet-based mental health screens for adolescents,[63] unvalidated diagnostic internet-based assessment tools available for purchase,[64] preliminary work that has been conducted on the development and validation of the internet and voice Diagnostic Interview Schedule for Children for DSM-IV,[65,66] and more extensive work completed on the Development and Well-Being Assessment (DAWBA) instruments,[67-69] there are many features that are unique to the three KSADS-COMP instruments that enhance their utility. To the best of our knowledge, the three versions of the KSADS-COMP are the only computer-administered child and adolescent psychiatric diagnostic interviews that use information attained in the introductory interview to guide probing of symptoms (eg, information about bullying to guide questions generated when probing about paranoid ideation) and the only assessment tools to include a screen interview that provides a comprehensive diagnostic overview to facilitate differential diagnoses before surveying the full range of symptoms associated with the different diagnoses. The clinician-administered KSADS-COMP is also the only computerized diagnostic interview that includes a parent and youth self-report preassessment to streamline interviewing and the only tool to give the clinician access to the preinterview responses and the responses of the other informant (eg, teen) when conducting the interview (Figure 1). The youth self-report KSADS-COMP is also the only psychiatric diagnostic instrument with video clips to facilitate administration. To date, Spanish, Dutch, and Danish translations of the KSADS-COMP instruments have been produced, with automated methods developed to create future translations.

Beyond determining categorical psychiatric diagnoses, there is growing interest in the field since the initiation of the National Institute of Mental Health Research Domain Criteria (RDoC) program in using dimensional assessments that map more clearly onto distinct neural circuits rather than heterogeneous categorical diagnoses.[70] With the diagnostic-specific dimensional scales included within the KSADS-COMP and plans to create KSADS-COMP transdiagnostic rating scales and refine the algorithms to integrate parent and youth self-report data to derive categorical diagnoses that more closely approximate clinician diagnoses, the KSADS-COMP may help serve as a bridge between *DSM* and RDoC diagnostic perspectives.

The RDoC, however, is a research framework with the goal of generating the necessary database to help derive a new psychiatric nomenclature informed by neuroscience, genetics, and psychology.[70] In the interim, clinicians are required to generate *DSM* or *ICD-10* diagnoses for assessment, treatment, and billing purposes. The clinician-administered KSADS-COMP shows utility not only for research but also for implementation in clinical settings, with the self-report preinterview ratings, choose-as-you-go module options, and automated scoring to streamline assessments and shorten administration time. The self-administered versions of KSADS-COMP have numerous potential research and clinical applications, including use in large-scale epidemiological studies, in schools and busy emergency departments, and in telehealth to address the critical shortage of child and adolescent mental health specialists in many areas of the United States.

Accepted May 13, 2019.

Drs. Townsend, Kearney, and Kaufman are with the Kennedy Krieger Institute, Baltimore, MD. Drs. Townsend and Kearney are also with Johns Hopkins School of Medicine, Baltimore, MD. Dr. Kobak and Ms. Deep are with Center for Telepsychology, Madison, WI. Drs. Milham, Andreotti, Escalera and Ms. Alexander are with Child Mind Institute, New York. Dr. Milham is also with Nathan Kline Institute, Orangeburg, NY. Dr. Birmaher and Mss. Gill, Sylvester, and Rice are with Western Psychiatric Institute and Clinic, University of Pittsburgh School of Medicine, PA.

KSADS-COMP Access Information: To test a demo or obtain access to the KSADS-COMP diagnostic instruments go to •••.

This work was funded by the National Institutes of Health/National Institute on Drug Abuse (NIH/NIDA; grant R44 MH094092 to Drs. Kaufman and Kobak) and the National Institute of Mental Health (NIMH; grant MH060952 to Dr. Birmaher), with additional support provided by the Zanvyl and Isabelle Krieger Fund (Dr. Kaufman).

Dhananjay Vaidya, PhD, of Johns Hopkins School of Medicine, served as the statistical expert for this research.

The authors extend appreciation to the consultants who contributed to this instrument, including Deanna M. Barch, PhD, of Washington University; Marco Grados, MD, of Johns Hopkins School of Medicine; Daniel Hoover, PhD, of Kennedy Krieger Institute; Ellen Leibenluft, MD, of National Institute of Mental Health; Danny Pine, MD, of National Institute of Mental Health; Kenneth Sher, PhD, of University of Missouri; and Susan F. Tapert, PhD, of University of California San Diego.

Disclosure: Dr. Kobak may in the future receive royalties from KSADSCOMP, LLC. Dr. Milham has received grant funding from NIH. Dr. Birmaher has received grant funding from NIH. Dr. Kaufman has received grant funding from NIH, has served as a consultant for Pfizer and Otsuka Pharmaceuticals, and may in the future receive royalties from KSADSCOMP, LLC. Drs. Townsend, Andreotti, and Escalera and Mss. Kearney, Alexander, Gill, Sylvester, Rice, and Deep report no biomedical financial interests or potential conflicts of interest.

Correspondence to Joan Kaufman, PhD, Center for Child and Family Traumatic Stress, Kennedy Krieger Institute, John Hopkins School of Medicine, 1741 Ashland Avenue, Room 434, Baltimore, MD 21205; e-mail: joan.kaufman@kennedykrieger.org

0890-8567/$36.00/©2019 Published by Elsevier Inc. on behalf of the American Academy of Child and Adolescent Psychiatry.

https://doi.org/10.1016/j.jaac.2019.05.009

REFERENCES

1. Kaufman J, Birmaher B, Brent D, *et al.* Schedule for Affective Disorders and Schizophrenia for School-Age Children–Present and Lifetime Version (K-SADS-PL): initial reliability and validity data. J Am Acad Child Adolesc Psychiatry. 1997; 36:980-988.

2. Endicott J, Spitzer RL. A diagnostic interview: the schedule for affective disorders and schizophrenia. Arch Gen Psychiatry. 1978;35:837-844.
3. Ambrosini PJ. Historical development and present status of the schedule for affective disorders and schizophrenia for school-age children (K-SADS). J Am Acad Child Adolesc Psychiatry. 2000;39:49-58.
4. Robb AS, Cueva JE, Sporn J, Yang R, Vanderburg DG. Sertraline treatment of children and adolescents with posttraumatic stress disorder: a double-blind, placebo-controlled trial. J Child Adolesc Psychopharmacol. 2010;20:463-471.
5. Findling RL, Robb A, Nyilas M, *et al*. A multiple-center, randomized, double-blind, placebo-controlled study of oral aripiprazole for treatment of adolescents with schizophrenia. Am J Psychiatry. 2008;165:1432-1441.
6. Findling RL, Pathak S, Earley WR, Liu S, DelBello MP. Efficacy and safety of extended-release quetiapine fumarate in youth with bipolar depression: an 8 week, double-blind, placebo-controlled trial. J Child Adolesc Psychopharmacol. 2014;24:325-335.
7. Findling RL, Nyilas M, Forbes RA, *et al*. Acute treatment of pediatric bipolar I disorder, manic or mixed episode, with aripiprazole: a randomized, double-blind, placebo-controlled study. J Clin Psychiatry. 2009;70:1441-1451.
8. Biederman J, Krishnan S, Zhang Y, McGough JJ, Findling RL. Efficacy and tolerability of lisdexamfetamine dimesylate (NRP-104) in children with attention-deficit/hyperactivity disorder: a phase III, multicenter, randomized, double-blind, forced-dose, parallel-group study. Clin Ther. 2007;29:450-463.
9. Schulz E, Fleischhaker C, Hennighausen K, *et al*. A double-blind, randomized, placebo/active controlled crossover evaluation of the efficacy and safety of Ritalin LA in children with attention-deficit/hyperactivity disorder in a laboratory classroom setting. J Child Adolesc Psychopharmacol. 2010;20:377-385.
10. Santisteban JA, Stein MA, Bergmame L, Gruber R. Effect of extended-release dexmethylphenidate and mixed amphetamine salts on sleep: a double-blind, randomized, crossover study in youth with attention-deficit hyperactivity disorder. CNS Drugs. 2014;28:825-833.
11. Dell'Agnello G, Maschietto D, Bravaccio C, *et al*. Atomoxetine hydrochloride in the treatment of children and adolescents with attention-deficit/hyperactivity disorder and comorbid oppositional defiant disorder: a placebo-controlled Italian study. Eur Neuropsychopharmacol. 2009;19:822-834.
12. Emslie GJ, Mayes T, Porta G, *et al*. Treatment of Resistant Depression in Adolescents (TORDIA): week 24 outcomes. Am J Psychiatry. 2010;167:782-791.
13. Brent D, Emslie G, Clarke G, *et al*. Switching to another SSRI or to venlafaxine with or without cognitive behavioral therapy for adolescents with SSRI-resistant depression: the TORDIA randomized controlled trial. JAMA. 2008;299:901-913.
14. Fluvoxamine for the treatment of anxiety disorders in children and adolescents. The Research Unit on Pediatric Psychopharmacology Anxiety Study Group. N Engl J Med. 2001;344:1279-1285.
15. Runyon MK, Deblinger E, Steer RA. Group cognitive behavioral treatment for parents and children at-risk for physical abuse: an initial study. Child Fam Behav Ther. 2010;32:196-218.
16. Kessler RC, Avenevoli S, Green J, *et al*. National comorbidity survey replication adolescent supplement (NCS-A): III. Concordance of DSM-IV/CIDI diagnoses with clinical reassessments. J Am Acad Child Adolesc Psychiatry. 2009;48:386-399.
17. Findling RL, Youngstrom EA, Fristad MA, *et al*. Characteristics of children with elevated symptoms of mania: the Longitudinal Assessment of Manic Symptoms (LAMS) study. J Clin Psychiatry. 2010;71:1664-1672.
18. Axelson D, Birmaher B, Strober M, *et al*. Phenomenology of children and adolescents with bipolar spectrum disorders. Arch Gen Psychiatry. 2006;63:1139-1148.
19. Lauth B, Levy SR, Juliusdottir G, Ferrari P, Petursson H. Implementing the semi-structured interview Kiddie-SADS-PL into an in-patient adolescent clinical setting: impact on frequency of diagnoses. Child Adolesc Psychiatry Ment Health. 2008;2:14.
20. Sorensen MJ, Nissen JB, Mors O, Thomsen PH. Age and gender differences in depressive symptomatology and comorbidity: an incident sample of psychiatrically admitted children. J Affect Disord. 2005;84:85-91.
21. Jensen-Doss A, Youngstrom EA, Youngstrom JK, Feeny NC, Findling RL. Predictors and moderators of agreement between clinical and research diagnoses for children and adolescents. J Consult Clin Psychol. 2014;82:1151-1162.
22. Miller PR. Inpatient diagnostic assessments: 2. Interrater reliability and outcomes of structured vs. unstructured interviews. Psychiatry Res. 2001;105:265-271.
23. Kobak KA, Greist JH, Jefferson JW, Katzelnick DJ. Computer-administered clinical rating scales. A review. Psychopharmacology (Berl). 1996;127:291-301.
24. Kobak KA, Taylor LH, Dottl SL, *et al*. A computer-administered telephone interview to identify mental disorders. JAMA. 1997;278:905-910.
25. Brodey BB, First M, Linthicum J, Haman K, Sasiela JW, Ayer D. Validation of the NetSCID: an automated web-based adaptive version of the SCID. Compr Psychiatry. 2016;66:67-70.
26. Kaufman J, Birmaher B, Axelson D, Pereplitchikova F, Brent D, Ryan N. The KSADS-PL DSM-5. Baltimore, MD: Kennedy Krieger Institute; 2016.
27. Posner K, Oquendo MA, Gould M, Stanley B, Davies M. Columbia Classification Algorithm of Suicide Assessment (C-CASA): classification of suicidal events in the FDA's pediatric suicidal risk analysis of antidepressants. Am J Psychiatry. 2007;164:1035-1043.
28. Alexander LM, Escalera J, Ai L, *et al*. An open resource for transdiagnostic research in pediatric mental health and learning disorders. Sci Data. 2017;4:170181.
29. Angold A, Costello EJ, Messer S, Pickles A, Winder F, Silver D. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. Int J Methods Psychiatr Res. 1995;5:237-249.
30. Thapar A, McGuffin P. Validity of the shortened Mood and Feelings Questionnaire in a community sample of children and adolescents: a preliminary research note. Psychiatry Res. 1998;81:259-268.
31. Kuo ES, Stoep AV, Stewart DG. Using the short Mood and Feelings Questionnaire to detect depression in detained adolescents. Assessment. 2005;12:374-383.
32. Daviss WB, Birmaher B, Melhem NA, Axelson DA, Michaels SM, Brent DA. Criterion validity of the Mood and Feelings Questionnaire for depressive episodes in clinic and non-clinic subjects. J Child Psychol Psychiatry. 2006;47:927-934.
33. Kent L, Vostanis P, Feehan C. Detection of major and minor depression in children and adolescents: evaluation of the Mood and Feelings Questionnaire. J Child Psychol Psychiatry. 1997;38:565-573.
34. Birmaher B, Khetarpal S, Brent D, *et al*. The Screen for Child Anxiety Related Emotional Disorders (SCARED): scale construction and psychometric characteristics. J Am Acad Child Adolesc Psychiatry. 1997;36:545-553.
35. Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. J Am Acad Child Adolesc Psychiatry. 1999;38:1230-1236.
36. Muris P, Merckelbach H, Ollendick T, King N, Bogie N. Three traditional and three new childhood anxiety questionnaires: their reliability and validity in a normal adolescent sample. Behav Res Ther. 2002;40:753-772.
37. Hughes CW. Child and Adolescent Measures for Diagnosis and Screening. Washington, DC: American Psychiatric Association; 2008.
38. Achenbach TM, Rescorla LA. Manual for ASEBA School-Age Forms and Profiles. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families; 2001.
39. Nakamura BJ, Ebesutani C, Bernstein A, Chorpita BF. A psychometric analysis of the Child Behavior Checklist DSM-Oriented Scales. J Psychopathol Behav Assess. 2009;31:178-189.
40. Lucas CP, Fisher P, Piacentini J, *et al*. Features of interviews questions associated with attenuation of symptom reports. J Abnorm Child Psychol. 1999;27:429-437.
41. Bangor A, Kortum P, Miller J. Determining what individual SUS scores mean: adding an adjective rating scale. J Usability Stud. 2009;4:114-123.
42. Brooke J. SUS: a 'quick and dirty' usability scale. In: Jordan PW, Thomas B, Weerdmeester BA, McClelland IL, eds. Usability Evaluation in Industry. London: Taylor & Francis; 1996:189-194.
43. Bangor A, Kortum P, Miller J. The system usability scale (SUS): an empirical evaluation. International Journal of Human-Computer Interaction. 2008;24:574-592.
44. Kobak KA, Reynolds WM, Griest JH. Computerized and clinician assessment of depression and anxiety: respondent evaluation and satisfaction. J Pers Assess. 1994;63:173-180.
45. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16:606-613.
46. Richardson LP, Rockhill C, Russo JE, *et al*. Evaluation of the PHQ-2 as a brief screen for detecting major depression among adolescents. Pediatrics. 2010;125:e1097-e1103.
47. Henry DB, Pavuluri MN, Youngstrom E, Birmaher B. Accuracy of brief and full forms of the Child Mania Rating Scale. J Clin Psychol. 2008;64:368-381.
48. Pavuluri MN, Henry DB, Devineni B, Carbray JA, Birmaher B. Child mania rating scale: development, reliability, and validity. J Am Acad Child Adolesc Psychiatry. 2006;45:550-560.
49. Spitzer RL, Kroenke K, Williams JB, Lowe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med. 2006;166:1092-1097.
50. Swanson JM, Schuck S, Porter MM, *et al*. Categorical and dimensional definitions and evaluations of symptoms of ADHD: history of the SNAP and the SWAN rating scales. Int J Educ Psychol Assess. 2012;10:51-70.
51. Prins A, Bovin MJ, Smolenski DJ, *et al*. The Primary Care PTSD Screen for DSM-5 (PC-PTSD-5): development and evaluation within a veteran primary care sample. J Gen Intern Med. 2016;31:1206-1211.
52. Prochaska JD, Le VD, Baillargeon J, Temple JR. Utilization of professional mental health services related to population-level screening for anxiety, depression, and post-traumatic stress disorder among public high school students. Community Ment Health J. 2016;52:691-700.
53. Cicchetti DV, Feinstein AR. High agreement but low kappa: II. Resolving the paradoxes. J Clin Epidemiol. 1990;43:551-558.
54. Gwet KL. Computing inter-rater reliability and its variance in the presence of high agreement. Br J Math Stat Psychol. 2008;61(Pt 1):29-48.

55. Wongpakaran N, Wongpakaran T, Wedding D, Gwet KL. A comparison of Cohen's Kappa and Gwet's AC1 when calculating inter-rater reliability coefficients: a study conducted with personality disorder samples. BMC Med Res Methodol. 2013;13:61.
56. Ong ML, Youngstrom EA, Chua JJ, *et al*. Comparing the CASI-4R and the PGBI-10 M for differentiating bipolar spectrum disorders from other outpatient diagnoses in youth. J Abnorm Child Psychol. 2017;45:611-623.
57. Young ME, Bell ZE, Fristad MA. Validation of a brief structured interview: the Children's Interview for Psychiatric Syndromes (ChIPS). J Clin Psychol Med Settings. 2016; 23:327-340.
58. Sheehan DV, Sheehan KH, Shytle RD, *et al*. Reliability and validity of the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID). J Clin Psychiatry. 2010;71:313-326.
59. Achenbach TM, McConaughy SH, Howell CT. Child/adolescent behavioral and emotional problems: implications of cross-informant correlations for situational specificity. Psychol Bull. 1987;101:213-232.
60. De Los Reyes A, Augenstein TM, Wang M, *et al*. The validity of the multi-informant approach to assessing child and adolescent mental health. Psychol Bull. 2015;141: 858-900.
61. Grills AE, Ollendick TH. Multiple informant agreement and the anxiety disorders interview schedule for parents and children. J Am Acad Child Adolesc Psychiatry. 2003; 42:30-40.
62. Kashani JH, Orvaschel H, Burk JP, Reid JC. Informant variance: the issue of parent-child disagreement. J Am Acad Child Psychiatry. 1985;24:437-441.
63. Diamond G, Levy S, Bevans KB, *et al*. Development, validation, and utility of internet-based, behavioral health screen for adolescents. Pediatrics. 2010;126:e163-e170.
64. MyMind-Lab; https://www.mymind-lab.co/bmhe. Q15
65. Steenhuis MP, Serra M, Minderaa RB, Hartman CA. An Internet version of the Diagnostic Interview Schedule for Children (DISC-IV): correspondence of the ADHD section with the paper-and-pencil version. Psychol Assess. 2009;21:231-234.
66. West P, Sweeting H, Der G, Barton J, Lucas C. Voice-DISC identified DSM-IV disorders among 15-year-olds in the west of Scotland. J Am Acad Child Adolesc Psychiatry. 2003;42:941-949.
67. Aebi M, Kuhn C, Metzke CW, Stringaris A, Goodman R, Steinhausen HC. The use of the development and well-being assessment (DAWBA) in clinical practice: a randomized trial. Eur Child Adolesc Psychiatry. 2012;21:559-567.
68. Goodman A, Heiervang E, Collishaw S, Goodman R. The 'DAWBA bands' as an ordered-categorical measure of child mental health: description and validation in British and Norwegian samples. Soc Psychiatry Psychiatr Epidemiol. 2011;46:521-532.
69. Goodman R, Ford T, Richards H, Gatward R, Meltzer H. The Development and Well-Being Assessment: description and initial validation of an integrated assessment of child and adolescent psychopathology. J Child Psychol Psychiatry. 2000;41:645-655.
70. Cuthbert BN, Insel TR. Toward the future of psychiatric diagnosis: the seven pillars of RDoC. BMC Med. 2013;11:126.