Texas Department of Mental Health and Mental Retardation

Validation and norms for the Ohio Scales among children served by the Texas Department of Mental Health and Mental Retardation

ABSTRACT

The Ohio Scales were examined in order to determine their suitability as a replacement test for the Child Behavior Check List (CBCL). A total of 775 children who were new admissions to 12 local Mental Health and Mental Retardation (MHMR) centers participated in the study. Test scores for the CBCL, Ohio Problems and Functioning scales and the Strengths and Difficulties Questionnaire (SDQ) were obtained at intake. Data for 33 children were obtained at a three month follow-up survey. Average reliability for the Ohio scales was high and inter-correlations between the various Ohio scales forms was reasonable. Correlations between the CBCL and the Ohio Problems scale were relatively high and between the CBCL and the Ohio Functioning scale were somewhat lower. Correlations between the SDQ and the Ohio Problems scale were relatively high and between the SDQ and the Ohio Functioning scale were somewhat lower. Based on suggested CBCL score cutoffs, Ohio Problems scale scores of 30 or above clearly indicate a clinical level of severity and scores of 12 and below clearly indicate a normal minimally symptomatic state. A range of 17 to 24 on the Ohio Problems scale appears to indicate borderline scores. Based on the Standard Error of Differences (SED), a change of 11 points will generally indicate significant change for the Ohio Problems scale and a change of 8 points will generally indicate significant change for the Ohio Functioning scale. Analysis of the Ohio Problems scale revealed three clear subscales; internalizing symptoms, externalizing symptoms and delinquent behaviors. The Ohio Problems subscales for internalizing and externalizing symptoms correlated with their CBCL internal and external subscale counterparts. The Ohio Functioning scale was unidimensional and did not have any clear subscales. At follow-up, on average, across the CBCL and the two Ohio scales, children exhibited a trend towards improved scores from intake to follow-up. Statistical tests revealed significant changes in the mean group scores for both the CBCL and the Worker Ohio scales but not for the Parent Ohio scales. However, across all Ohio scale forms the scores were changing in the predicted direction of improvement. Individual's change scores were also evaluated using each test's SED. Results generally indicate that the Ohio scales have adequate reliability, validity and sensitivity to change. It appears that the Ohio Problems scale can be substituted for the CBCL total score without creating substantial validity problems.

Validation and norms for the Ohio Scales among children served by the Texas Department of Mental Health and Mental Retardation

The Texas Department of Mental Health and Mental Retardation (TDMHMR) has used the CBCL as a means to collect data for outcomes on the local level and to report performance measures to the legislature. In an effort to make clinical assessments more efficient and to achieve financial savings TDMHMR will replace the CBCL with the Ohio scales. In order to substitute the Ohio scales for the CBCL information on the relation of the Ohio scales with the CBCL was needed. The primary purpose of this study was to examine the relation of Ohio scales with the CBCL and to establish preliminary norms for the Ohio scales.

METHOD

Participating Local MHMR Centers

The local MHMR centers with the largest number of client intakes in the past and the four pilot resiliency and disease management MHMR centers were asked to voluntarily participate in this study. The majority of the local MHMR centers with the largest number of intakes in the past and all four pilot resiliency and disease management MHMR centers agreed to participate. Substitute local MHMR centers were recruited to replace sites that were unable to participate. Intake data was collected during May and June of 2003. A total of 12 local MHMR centers participated in the study, the participants were: Harris county MHMR (Houston), The Center for Health Care Services (San Antonio), Tropical Texas Center for MHMR (Brownsville-Harlingen-San Benito-McAllen-Edinburg-Mission), Nueces County (Corpus Christi), Border Region MHMR (Laredo), The Spindletop MHMR (Beaumont-Port Arthur), Texana MHMR, Tarrant County MHMR (Fort Worth), Texas Panhandle MHMR (Amarillo), Lubbock Regional MHMR, Hill County MHMR, and Coastal Plains MHMR. Follow-up data was collected during the Fall of 2003.

Tests

Test scores from the CBCL, Ohio Problems scale, Ohio Functioning scale and the Strengths and Difficulties Questionnaire (SDQ) were collected from children at intake. Test scores for the CBCL and the Ohio scales were collected at follow-up.

The CBCL is a widely used instrument for detecting emotional and behavioral problems in children and adolescents (Achenbach, 2000). The CBCL can be self-administered or administered by an interviewer. The CBCL consists of 118 items addressing various behavior problems. The items are scored on a 3-point scale ranging from not true to often true of the child. There are three possible CBCL forms, one for children age 1 ½ t o5 completed by the parent, one for children age 6 to 17 completed by the parent, and the YSR (Youth Self Report) completed by children age 11 to 17 for themselves. Although the CBCL has 10 specific delimited subscales, only the broad higher order subscale scores of externalizing, internalizing, and total problems were reported to TDMHMR.

The Ohio scales (Ogles, Melendez, Davis & Lunnen, 2001; Ogles, Lunnen, Gillespie & Trout, 1996) are designed to measure the level of symptom severity and functioning of children. The five specific scales included in the Ohio scales are Problems, Functioning, Hopefulness, Satisfaction, and Restrictiveness of Living Environments Scale (ROLES). Only the Ohio Problems scale and Ohio Functioning scale were used in this study. The Ohio Problems scale measures symptom severity and consists of 20 questions rated on a 6-point scale ranging from 0 (Not at all) to 5 (All of the time) with higher scores indicating worse symptoms. The Functioning scale consists of 20 questions rated on a 5-point scale ranging from 0 (Extreme troubles) to 4 (Doing very well) lower scores indicate poorer functioning.

The Strengths and Difficulties Questionnaire or SDQ (Goodman, 1997; Goodman, Meltzer & Bailey, 1998) is a brief 25 question screening instrument made up of five subscales that measure emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and pro-social behaviors. A total difficulties score is also computed using four of these five subscales.

All three tests, the CBCL, the Ohio scales and the SDQ come in different forms that can be completed by youth self report or parent report, and also a worker (clinician) report for the Ohio scales. The different test forms for each test ask similar questions and produce equivalent scores. According to the information provided in the manuals the SDQ and the Ohio scales can be completed in less than 10 minutes each. The SDQ is available in many different languages and the Ohio scales are available in Spanish.

Data collection procedure from children

The study design was intended to collect the SDQ and Ohio scales from parent, youth and clinical staff at the initial intake visit. In addition, the standard intake assessment which included the CBCL was given to the parent or child at that time and after completion was entered into the Client Assessment and Registration System (CARE) database.

Tests were distributed during the initial intake interview. Each center was asked to provide a copy of the SDQ and the Ohio scales as part of the intake packet paperwork that each consumer must complete prior to being seen (such as Consent for Treatment, Release of Information forms). Staff were asked to explain to the client and family how to complete the forms. The Parent/Caregiver and child forms of the SDQ and Ohio scales were to have been completed prior to the initial intake interview. The Worker form of the Ohio scales was supposed to have been completed during the intake interview.

The minimum data that was requested for each client at intake included the SDQ completed by Parent (using an appropriate form for the child's age), the Ohio scales completed by the Parent (Short Form P) and the Ohio scales completed by the Agency Worker (Short Form W). The Ohio scales completed by the Youth (Short Form Y) was voluntary. Approximately every two weeks the completed tests were mailed to TDMHMR's Central Office.

Description of the sample retained for analysis

A total of 775 children's SDQ and Ohio scales forms were matched to CARE data records. Matching between the SDQ and Ohio scales forms with the CARE data records was based on the unique identifiers for each local MHMR center (component code) and then either the CARE client ID number or the local MHMR center case number. Comparison of the client names contained on the CARE data records with those on the SDQ and Ohio scales forms confirmed that the matches were accurate.

There were 536 males (69%) and 239 females (31%). The racial-ethnic distribution of the children was 407 Hispanic/Latinos (53%), 202 White/Anglos (26%), 157 Black/African Americans (20%) and 9 reporting other races/ethnicity's (1%). The average age was 12.8 (SD = 3.5) with a range from 2 to 17. Only 42 children were age 0 to 5 (5.4%), there were 222 age 6 to 12 (29%) and 511 age 13 to 17 (66%). Grade data was available for 664 of the children. The average grade was 7 (SD = 2.9). There were 25 children (3.7%) in Kindergarten or Pre-K. There were 189 children (28%) in 1st through 6th grade. There were 450 children (67%) in 7th through 12th grade.

Seven diagnostic groups accounted for approximately 90% of the children. The most frequent diagnostic groups (based on primary diagnosis) for children were: 203 conduct disorders (26%), 178 Attention Deficit Hyperactivity Disorder (22%), 109 Depression NOS and Mood Disorders NOS (14%), 82 Major Depression (11%), 84 Adjustment Disorders (11%), 35 Bipolar Depression (4.5%) and 24 Anxiety Disorders (3%).

Implementation problems

There were a number of problems encountered during the course of the study. One problem was that the specific test forms returned for children varied considerably. Most children only had two or three tests completed so the size of the sample with valid data between pairs of tests varies. There were a total of 711 children with valid CBCL scores obtained from the CARE child and adolescent evaluation assessment form (CEA1). Most children had completed Worker Ohio Problems scales (N = 732) but fewer had completed Parent Ohio Problems scales (N = 540) or Youth Ohio Problems scales (N =

252). Because the Ohio Functioning scale was printed on a second page or on the back of the Ohio Problems scale, somewhat fewer children had complete data for the Ohio Functioning scales. Most children had completed Worker Ohio Functioning scales (N = 619) but fewer had completed Parent Ohio Functioning scales (N = 447) or Youth Ohio Functioning scales (N = 219). Similarly, the SDQ was also provided as a separate sheet further back in the application/test packet so relatively few had completed Parent SDQ (N = 320) or Youth SDQ (N = 238) test forms.

While a total of 1,161 Ohio scales and SDQ tests were received from the local MHMR centers, some of the completed Ohio scales and SDQ forms did not include valid CARE ID numbers or local MHMR center case numbers. This resulted in an inability to match 184 children's Ohio scales and SDQ tests with CARE data. An additional 234 matches between CARE data and the Ohio scales and SDQ tests were found to be for children with update or termination assessments instead of intake assessments. Because the study design required intake assessments these children were excluded from the analysis.

The Ohio Functioning scale is scored in a reverse direction from all the other scales in the test packet, with higher numbers indicating better functioning and lower numbers indicating worse functioning. This pattern is reversed from the Ohio Problems scale in which higher numbers indicate more or worse symptoms and lower numbers indicate fewer or less severe symptoms. It appears that at least some children apparently completed the Ohio Functioning scale in the "wrong" direction relative to their symptom severity scores (as measured by the CBCL and the Ohio Problems scale). However, because it is difficult to determine when this occurred the data was analyzed "as is" and no attempt was made to clean the data or drop particular cases. Consequently the correlations between the Ohio Functioning scale and the CBCL are somewhat smaller than between the CBCL and the Ohio Problems scale. In addition, a variant copy of the Ohio Functioning scale with "reverse" question response anchors (to make the responses consistent with the other scales) was in circulation among the centers for several weeks before being retracted. Because in most cases the actual forms, rather

than only summary scores, were returned it was generally possible to catch and reverse the scores from these forms.

There were also a number of problems encountered in obtaining follow-up data. Initially only the four resiliency and disease management pilot sites were going to provide follow-up data, however it become apparent that they would provide insufficient data. Therefore the other sites were asked to voluntarily provide follow-up data also. Some sites did not provide follow-up data. However, for the sites that did participate in follow-up, TDMHMR had to provide lists of the exact clients that needed follow-up tests based on active cases at the end of the fiscal year. This created an additional delay that caused the follow-up sample size to shrink because the majority of clients had already passed their 90 day follow-up period by the time the lists of eligible clients were generated. Finally, the change over in data collection systems, forms and procedures for the four pilot resiliency and disease management sites from the old CARE system to the new system also probably caused the follow-up sample size to shrink.

RESULTS

The basic descriptive statistics for the Ohio Problems scales and Ohio Functioning scales are summarized in Table 1 (located in the back half of the report) as are the descriptive statistics for the CBCL and SDQ. The correlations between the CBCL and SDQ with the Ohio Problems scale and Ohio Functioning scale are displayed in Table 2.

Worker Ohio Problems scale

There were 732 children with Ohio Problems scale data for the Worker form. The data for these children was either complete or missing only a single item. The mean for this group was 27.4 (SD = 17) with a median of 26. The 25^{th} and 75^{th} percentiles, defining the inter-quartile range, were 14 and 39.

Coefficient alpha, a measure of a scales reliability, was quite high at .903 based on the raw item scores and .901 based on the standardized item scores. Coefficient alpha was computed using the 702 children with no missing items.

The correlation for 671 children between the Worker Ohio Problems scale and the CBCL total score was r = .66 (p < .001). The correlations for 228 and 301 children respectively between the Worker Ohio Problems scale and the Child and Parent SDQ total difficulties scores were r = .55 (p < .001) and r = .37 (p < .001).

Parent Ohio Problems scale

There were 540 children with Ohio Problems scale data for the Parent form. The data for these children was either complete or missing only a single item. The mean for this group was 31.8 (SD = 19) with a median of 30. The 25th and 75th percentiles, defining the inter-quartile range, were 17 and 44.

Coefficient alpha, a measure of a scales reliability, was quite high at .906 based on the raw item scores and .903 based on the standardized item scores. Coefficient alpha was computed using the 481 children with no missing items.

The correlation for 509 children between the Parent Ohio Problems scale and the CBCL total score was r = .64 (p < .001). The correlations for 55 and 298 children respectively between the Parent Ohio Problems scale and the Child and Parent SDQ total difficulties scores were r = .43 (p < .001) and r = .63 (p < .001).

Youth Ohio Problems scale

There were 252 children with Ohio Problems scale data for the Youth form. The data for these children was either complete or missing only a single item. The mean for this group was 14.2 (SD = 14) with a median of 10. The 25th and 75th percentiles, defining the inter-quartile range, were 4 and 19.

Coefficient alpha, a measure of a scales reliability, was quite high at .92 based on the raw item scores and .918 based on the standardized item scores. Coefficient alpha was computed using the 248 children with no missing items.

The correlation for 220 children between the Youth Ohio Problems scale and the CBCL total score was $r = .62$ ($p < .001$). The correlations for 180 children between the Youth Ohio Problems scale and the Child SDQ total difficulties score were $r = .56$ ($p < .001$). There were an insufficient number of children ($n = 5$) with both Youth Ohio Problems scale and Parent SDQ to analyze.

Overview of Ohio Functioning scale

Data for some of the Ohio Functioning scales appeared to be incorrectly filled out. The Ohio Functioning scale is scored in a reverse direction from all the other scales that were used. It appears that at least some of the children had extremely high scores on the Ohio Functioning scale while simultaneously having very high symptom scores on the Ohio Problems scale or CBCL. Generally it would be expected that high levels of symptoms and low levels of functioning go together. However, it is difficult to determine which scores are potentially wrong versus those that actually reflect high functioning children with high symptom levels. Therefore the data was left “as is”. However, these scores may be somewhat inaccurate. The validity of the data for the Ohio Functioning scales should be considered provisional.

Worker Ohio Functioning scale

There were 619 children with Ohio Functioning scale data for the Worker form. The data for these children was either complete or missing only a single item. The mean for this group was 45.1 (SD = 14) with a median of 45. The 25^{th} and 75^{th} percentiles, defining the inter-quartile range, were 35 and 55.

Coefficient alpha, a measure of a scales reliability, was quite high at .927 based on the raw item scores and .927 based on the standardized item scores. Coefficient alpha was computed using the 584 children with no missing items.

The correlation for 619 children between the Worker Ohio Functioning scale and the CBCL total score was r = - .55 (p < .001). The correlations for 192 and 247 children respectively between the Worker Ohio Functioning scale and the Child and Parent SDQ total difficulties scores were r = -.47 (p < .001) and r = -.35 (p < .001).

Parent Ohio Functioning scale

There were 447 children with Ohio Functioning scale data for the Parent form. The data for these children was either complete or missing only a single item. The mean for this group was 42.8 (SD = 15) with a median of 43. The 25th and 75th percentiles, defining the inter-quartile range, were 32 and 54.

Coefficient alpha, a measure of a scales reliability, was quite high at .931 based on the raw item scores and .932 based on the standardized item scores. Coefficient alpha was computed using the 365 children with no missing items.

The correlation for 447 children between the Parent Ohio Functioning scale and the CBCL total score was r = - .53 (p < .001). The correlations for 45 and 235 children respectively between the Parent Ohio Functioning scale and the Child and Parent SDQ total difficulties scores were r = -.28 (p < .001) and r = -.49 (p < .001).

Youth Ohio Functioning scale

There were 219 children with Ohio Functioning scale data for the Youth form. The data for these children was either complete or missing only a single item. The mean for this group was 59.3 (SD = 13) with a median of 60. The 25th and 75th percentiles, defining the inter-quartile range, were 50 and 70.

Coefficient alpha, a measure of a scales reliability, was quite high at .916 based on the raw item scores and .918 based on the standardized item scores. Coefficient alpha was computed using the 212 children with no missing items.

The correlation for 219 children between the Youth Ohio Functioning scale and the CBCL total score was r = - .52 ($p < .001$). The correlations for 150 and 45 children respectively between the Youth Ohio Functioning scale and the Child and Parent SDQ total difficulties scores were r = -.42 ($p < .001$) and r = -.28 ($p < .001$).

Correlations between the Ohio scales Worker, Parent and Youth forms.

Overall the Ohio scales scores for the Worker, Parent and Youth forms were systematically related. The inter-correlations between all the Ohio scales from the different forms are displayed in Table 3. However, recall from the means discussed above and displayed in Table 1 that the Parent and Worker scores tended to be more similar to one another, while the Youth scores tended to indicate less symptom severity and greater functioning than the Parent of Worker forms did.

Regressions of CBCL and Ohio Scales

Bi-directional regression equations of the Ohio Scales as predictors of the CBCL and the CBCL as predicators of the Ohio Scales are summarized in Table 4. In general the CBCL as a predictor of the Ohio Problems scale (and vice versa) was a slightly more robust association with an average RSQ of .40 than the association of the CBCL and the Ohio Functioning scale with an average RSQ of .29. RSQ is the squared multiple correlation for the regression equation and it is a measure of the proportion of variance (ranging from 0 to 1.0) accounted for by the regression equation.

Mean Scores by Demographic groups, Diagnostic groups and test form

One-way analysis of variance (ANOVA) with post-hoc Tukey tests were used to examine possible pairwise differences among the means of the CBCL and Ohio scales. The four major areas of interest that were used for pairwise comparisons were sex, age, ethnicity and major diagnostic groups.

In general the ANOVA's for sex revealed that females had worse symptom scores than males. The specific scale means for each sex are displayed in Appendix A. Females CBCL, Worker Ohio Problems scale and Youth Ohio Problems scales had statistically

significantly higher scores than females indicating greater symptom severity. However, there was only a single difference in functioning, in which males Parent Ohio Functioning scales had statistically significantly lower scores than females.

In general the ANOVA's for age revealed that children age 6 to 12 had worse symptom scores and functioning than children age 13 to 17. The specific scale means for each age group are displayed in Appendix B. For the CBCL total score, children age 13 to 17 had significantly lower scores than children age 0 to 5 or children age 6 to 12. For all three Ohio Problems scales (Worker, Parent and Youth) children age 6 to 12 had statistically significantly higher scores than children age 13 to 17 indicating greater symptom severity among children age 6 to 12. For two of the three Ohio Functioning scales (Worker and Parent) children age 6 to 12 had statistically significantly lower scores than children age 13 to 17 indicating poorer functioning among the children age 6 to 12.

The ANOVA's for ethnicity were mixed and no clear generalizations appeared. The specific scale means for each age group are displayed in Appendix C. The ANOVA and post hoc Tukey test for the CBCL total score revealed that all three groups (Black, White, Hispanic) were significantly different from one another with Blacks having the lowest scores and Whites the highest. A somewhat similar result was found for the Worker Ohio Problems scale with the only difference being the Whites and Hispanics scores were not different from one another. For the Parent Ohio Problems scales the only statistically significant difference was that Whites had higher scores than Hispanics. For the Worker Ohio Functioning scales the only statistically significant difference was that Whites had lower scores than Blacks indicating poorer functioning. There were no statistically significant differences among the groups on the Youth Ohio Problems scale, or the Parent and Youth Ohio Functioning scales.

In general the ANOVA's for the six major diagnostic groups revealed that children whose primary diagnosis was Conduct Disorder had better symptom scores and somewhat better functioning than children with any other diagnosis. The specific scale

means for each diagnostic group are displayed in Appendix D. For the CBCL total score, children with Conduct Disorder had significantly lower scores than children with any other diagnoses, indicating they in general have less severe symptoms. For the Worker Ohio Problems scale, children with Conduct Disorder had significantly lower scores than children with all other diagnoses except Anxiety, indicating they in general have less severe symptoms. For the Youth Ohio Problems scale, children with Conduct Disorder had significantly lower scores than children with Bipolar Disorder or Other Mood Disorders. For the Worker Ohio Functioning scale, children with Conduct Disorder had significantly higher scores than children with diagnoses of Bipolar, ADHD, or Major Depression, indicating they have better functioning. For the Parent Ohio Functioning scale, children with Other Mood Disorders had significantly higher scores than children with diagnoses of Conduct Disorder or ADHD, indicating they have better functioning.

Appendix E examines possible differences among means by CBCL test form type. The overall ANOVA indicated a significant difference among the score means for the CBCL, the YSR and the CBCL for children age 1 ½ to 5. Post-hoc Tukey pairwise comparisons revealed that the YSR mean scores were significantly lower than the other two CBCL test form scores (between whom there was no difference). This finding is similar to that for the Youth Ohio scales that revealed the Ohio Scales completed by Youth have lower levels of symptom severity. However, it is recommended that the Youth forms should not be discarded or discounted, but considered as an additional or backup piece of information for assessing clients progress.

Appendix F examines the possible impact of the different CBCL form types on correlations with the Ohio scales. Although there were differences among the correlations most of them were relatively minor. For example the correlation of the CBCL with the Worker Ohio Problems scales always remained statistically significant but did vary from r = .50 to r = .64 across the three test forms. Differences should not materially effect the results of the study in any major way. However, in a number of the analyses children age 0 to 5 were frequently excluded and children completing the YSR

were often excluded. Specific groups, if any, that were excluded are identified in the notes section of each table.

Mean scores by CBCL Severity groups

Children were categorized into four severity groups based on their CBCL total scores. The score ranges are based on those suggested by the CBCL test manual, with the exception of a severe group who have CBCL scores 10 points above the clinical range. The normal group was defined as having CBCL scores of 59 and below. The borderline group was defined as having CBCL scores between 60 and 63. The clinical group was defined as having CBCL scores between 64 and 74. The severe group was defined as having CBCL scores of 75 and above. Table 5 summarizes all the data described below for each clinical severity group.

There were 190 children in the normal group with a mean CBCL total score of 49.7 (SD = 8.0). The average Ohio Problems scale scores (Workers, Parents and Youth) for this group ranged from 8 to 14. The average Ohio Functioning scale scores (Workers, Parents and Youth) for this group ranged from 55 to 64.

There were 73 children in the borderline group with a mean CBCL total score of 61.7 (SD = 1.0). The average Ohio Problems scale scores (Workers, Parents and Youth) for this group ranged from 15 to 22. The average Ohio Functioning scale scores (Workers, Parents and Youth) for this group ranged from 49 to 56.

There were 275 children in the clinical group with a mean CBCL total score of 69.5 (SD = 3.0). The average Ohio Problems scale scores (Workers, Parents and Youth) for this group ranged from 25 to 30. The average Ohio Functioning scale scores (Workers, Parents and Youth) for this group ranged from 41 to 50.

There were 173 children in the severe group with a mean CBCL total score of 79.7 (SD = 4.8). The average Ohio Problems scale scores (Workers, Parents and Youth) for this

group ranged from 34 to 47. The average Ohio Functioning scale scores (Workers, Parents and Youth) for this group ranged from 35 to 50.

Recommended Clinical and Normal Score Ranges

Ohio Problems scale scores of 30 or above clearly appear to indicate a clinical level of severity. Scores of 30 are approximately the average score for children scoring in the clinical CBCL range. Given the standard deviation of these children's scores (around 13) it appears that Ohio Problems scale scores of as low as 17 could indicate serious problems. The mean Ohio Problems scale score for the normal group is approximately 12 with a standard deviation of around 12. Based on going on standard deviation above the normal groups mean (12 + 12 = 24) and one standard deviation below the clinical groups mean (30 - 13 = 17) indicates that the range of 17 to 24 would appear to be an area indicating borderline scores. This range is consistent with the means for the actual group of children who had borderline CBCL scores as their Ohio Problems scales scores were approximately 20 with a standard deviation of 13. Therefore for the Ohio Problems scale the clinical range appears to be scores of 25 and greater, the borderline range scores of 17 to 24, and the normal range scores of 16 and below.

For the Ohio Functioning scale the normal group had a mean of around 59 and the severe group had a mean of around 39. Going one SD down from the normal group results in 48 as the bottom of the normal range. Going one SD above the severe group results in 51 as the top of the clinical range. Since the two ranges overlap, using a half standard deviation above and below the clinical and normal groups mean scores should produce a reasonable estimate for borderline scores. This gives a borderline range of 45 to 53. Ohio Functioning scale scores of 44 and below appear to be clinical and functioning scores of 54 and above appear to be normal.

Potential scores to be used for the Ohio Problems scale and the Ohio Functioning scale for defining normal, borderline and clinical groups are displayed in Table 6.

Size of significant score differences for the Ohio Scales

The change scores required for the Ohio Scales needs to be determined. Previously TDMHMR has measured change using the CBCL. Achenbach's website suggests that a change of two standard errors of measurement (SEM) can be considered to exceed most chance fluctuations for the CBCL. Almost certainly this is referring to the Standard Error of Differences (SED). This can also be computed for the Ohio Scales. The Standard Error of Differences is a widely accepted measure of what constitutes a statistically significant difference between two test scores. The SED for the Ohio Scales is calculated below. Other change score indexes could also be calculated.

The SED can be used to evaluate the whether the differences between pairs of scores for the same individual are large enough to be considered statistically significant. A difference between two scores that is greater than the SED is considered statistically significant and a difference between two scores that is smaller than the SED is not considered statistically significant. The SED is usually calculated as SED = 1.96*SEM, where SEM is the standard error of measurement. The standard error of measurement (SEM) is the standard deviation of the test times the square root of one minus the reliability, SEM = SD*SQRT(1-Alpha).

The SED provides a number with which to determine whether the difference between two scores is statistically significant. For our purposes the SED answers the question of how the individual's score at intake compares with the 90 day follow-up score. The SED indicates the size of the difference that is needed between the intake and 90 day follow-up needed to be considered a statistically significant change. Table 7 shows the estimated size of the change scores required for each scale. Generally each of the SED corresponds to an effect size of slightly more than half a standard deviation, which would be considered to be an average effect size. Effect size is a standardized way of expressing the magnitude of a change, e.g. how big or small the effect is. Each form of the test (Worker, Parent, Youth) has its own individual change score but across the three tests the averages are relatively close (not off more than 2 points from each other). For the Ohio Problems scale a change of 11 points would be appropriate (this

being halfway between the SED for the Parent and Worker forms). For the Ohio Functioning scale a change of 8 points would be appropriate.

Principal Components Analysis of the Ohio scales

Principal components analyses were conducted on the Ohio Problems scale and the Ohio Functioning scale to determine if there were any possible coherent groups of items which could be used as subscales. These principal components analyses with varimax rotation were conducted on all three samples of Ohio scales forms completed by parents, workers and youth.

The Ohio Problems scale revealed three groups of items that appear to form coherent subscales. The three groups of items identified in the principal components analyses were internalizing symptoms, externalizing symptoms and delinquent behaviors. These three groups of items emerged consistently across all three samples of parent, worker and youth scales. Table 8 summarizes the item loadings which are an indication of how strongly each item is related to the underlying dimension. These item loadings are equivalent to the correlation of a particular item with the subscale defined by that principal component.

Eight external items all loaded together on a single principal component. These items were #1 arguing with others, #2 getting into fights, #3 yelling, swearing and screaming, #4 fits of anger, #5 refusing to do things, #6 causing trouble for no reason, #10 lying and #11 can’t seem to sit still.

Nine internal items all loaded together on a single principal component. These items were #12 hurting self, #13 talking or thinking about death, #14 feeling worthless or useless, #15 feeling lonely, #16 feeling anxious or fearful, #17 worrying, #18 feeling sad or depressed, #19 nightmares and #20 eating problems.

Three delinquent items all loaded together on a single principal component. These items included #7 using drugs or alcohol, #8 breaking rules or breaking the law and #9 skipping school.

Although there were a few items with a loading larger than .30 on two or more principal components all of the items clearly had a large primary loading and a smaller secondary loading. Moreover, the use of two or four component solutions did not clearly produce a better structure. The three component solution appears to best account for the underlying structure of the data. These results suggest that the delinquent behavior items form a distinct group from the internal and external symptom items.

The Ohio Problems scale items were summed into subscales using the item groups indicated by the principal components analysis described above. These three Ohio Problems subscales were then correlated with the CBCL total score and the CBCL internal and external subscale scores. The results are summarized in Table 9. The Ohio Problems subscales for external symptoms for parents, workers and youth were more highly correlated with the CBCL external subscale (M = .58, SD = .04) than with either the CBCL total score (M = .54, SD = .06) or the CBCL internal subscale (M = .37, SD = .08). The Ohio Problems subscales for internal symptoms for parents, workers and youth were more highly correlated with the CBCL internal subscale (M = .62, SD = .02) than with either the CBCL total score (M = .57, SD = .04) or the CBCL external subscale (M = .34, SD = .09). Although Ohio Problems subscale for delinquent behavior for parents, workers and youth were slightly more highly correlated with the CBCL externalizing scores these correlations were in the .30 range and the delinquent behavior subscales were not particularly highly correlated with any CBCL scores (M = .23, SD = .10).

This overall pattern of correlations indicates that Ohio Problems subscales for internal and external symptoms have a relatively high degree of convergent validity with similar CBCL subscales. The Ohio internal and external symptom subscale correlations with the CBCL total score are only slightly smaller than their correlations with their respective

CBCL internal and external subscale counterparts (average difference = - .05). This indicates that the subscales would probably not perform particularly better than the overall total score as a method of general screening. However, because the difference in correlations between internal and external symptoms of the Ohio and CBCL subscales are large (average difference = .29), the Ohio Problems subscales may be able to efficiently identify specific subgroups of children based on their symptoms. The subscales scores would probably be a useful adjunct to clinical judgement and diagnoses when assigning patients to subgroups.

The principal components analysis results for the Ohio Functioning scale indicated that there were no coherent subgroups of items that could be used to form subscales. The analyses across the three samples resulted in inconsistent patterns of loadings for the rotated components. The overall results strongly suggest that the Ohio Functioning scale is best considered a single unitary measure of functioning.

Change scores for the Ohio and CBCL from Intake to Follow-up

A total of 33 participants from the initial intake sample had complete data available for both the CBCL and the Ohio scales at the 90 day follow-up period. While the average time difference between the intake CBCL and Ohio scales was 1.1 days (SD = 3.1) the average difference between follow-up CBCL and Ohio scales was 22.4 days (SD = 34.1). However, these were not evenly distributed with about one-third being a difference of only few days and the remainder being a difference of around one month (which corresponds roughly with the typical appointment interval for many centers). On average the initial and follow-up Ohio scales were separated by 124 days (SD = 25.3) and the initial and follow-up CBCLs were separated by 100.2 days (SD = 16.7). So the average follow-up period was about three and a half months, only slightly longer than the standard 90 day follow-up.

Because the Ohio scale scores for intake and follow-up available for each individual participant varied, four separate analyses by form type (Parent and Worker) and Ohio scale type (Problems and Functioning) were conducted. Complete intake and follow-up

test score pairs were available for 33 CBCL tests, 27 Parent Ohio Problem scales, 22 Parent Ohio Functioning scales, 22 Worker Ohio Problems scales, and 20 Worker Ohio Functioning scales.

Table 10 summarizes the Ohio and CBCL scores and their changes from intake to follow-up. On average, across the CBCL and the two Ohio scales, children exhibited a trend towards improved scores from intake to follow-up. Statistical tests revealed significant changes in the mean group scores of all children for the CBCL (with an average decrease of about 6 points) across all four subsets of children (as defined by the complete pairs of Ohio scale scores that they had).

Statistical tests did not indicate significant changes in the mean group scores of all children for the Parent Ohio Problems scale (with an average decrease in problems of 5.6 points). Statistical tests did not indicate significant changes in the mean group scores of all children for the Parent Ohio Functioning scale (with an average increase in functioning of 5.3 points). Both of these results were probably not statistically significant because of the slightly smaller more variable size of the changes and the relatively small sample size.

Statistical tests did indicate significant changes in the mean group scores of all children for the Worker Ohio Problems scale (with an average decrease in problems of 15.6 points). Statistical tests did indicate significant changes in the mean group scores of all children for the Worker Ohio Functioning scale (with an average increase in functioning of 11.1 points). Both of these results were probably statistically significant because of the slightly larger and less variable size of the changes as compared to the Parent Ohio scales.

A standardized measure of change can also be computed using effect size. This is calculated as the group intake mean minus the group follow-up mean divided by the intake standard deviation. This statistic is known as Cohen’s d. The effect size allows an assessment of the size of the change in standard deviation units and is useful for

gauging the impact of a treatment. Effect sizes of .2 are considered small, .5 average and .8 or greater large. The effect sizes in this study ranged from slightly under average to large. Across all 33 children the CBCL intake to follow-up effect size was d = .76 indicating a large effect. For the 27 Parent Ohio Problem scales the effect size was d = .31 indicating a moderate effect. For the 27 Parent Ohio Functioning scales the effect size was d = -.39 indicating a moderate effect. For the 22 Worker Ohio Problem scales the effect size was d = 1.24 indicating a very large effect. For the 20 Worker Ohio Functioning scales the effect size was d = -1.21 indicating a very large effect. Notice that compared to the CBCL which stays relatively consistent across the four groups (d = .62 to .82) the Parent Ohio scales show smaller effect sizes and the Worker Ohio scales show large effect sizes.

It is possible that the difference between Parent and Worker versions of the Ohio scales indicates that the workers are seeing more changes in the clients from intake to follow-up than are the parents. However, because the groups are small and only overlap slightly (being composed of only about a dozen children in common across any particular pair of Ohio scales) it is not appropriate to determine empirically if this is the case without excessive capitalization on chance. The extremely small follow-up sample size relative to the initial intake sample makes it highly likely that the differences between the Parent and Worker Ohio scales are simple due to random factors that would not be found in larger comprehensive samples. Future research can examine the possibility that parents and workers are giving systematically different ratings.

Turning from the group means to individuals we can determine the number of individuals who had statistically significant changes between their own intake and follow-up scores as measured by the SED (Standard Error of Differences). Recall each test has its own specific SED. Change scores were computed for each individual by subtracting the follow-up score for each test from the intake score for each test. These change scores were used in the analysis described below.

Across all children with CBCL score pairs there were a total of 19 children (58%) whose CBCL scores from intake to follow-up decreased by 5 or more points indicating a significant decrease in symptoms. There were a total of 12 individuals (44%) whose Parent Ohio Problems scale scores from intake to follow-up decreased by 10 or more points indicating a significant decrease in symptoms. There were a total of 9 individuals (41%) whose Parent Ohio Functioning scores from intake to follow-up increased by 8 or more points indicating a significant increase in functioning. There were a total of 15 individuals (68%) whose Worker Ohio Problems scale scores from intake to follow-up decreased by 10 or more points indicating a significant decrease in symptoms. There were a total of 10 individuals (50%) whose Worker Ohio Functioning scores from intake to follow-up increased by 8 or more points indicating a significant increase in functioning.

The group means in Table 10 summarize the overall results such that one possible interpretation is that across the Parent and Worker Ohio scales a decrease of 6 points in a CBCL scores is approximately equal to a decrease of 10 points on the Ohio Problems scale and an increase of 10 points on the Ohio Functioning scale. However, because the Parent and Worker Ohio scales differ in the size of the changes regression equations were computed for each scale that allow a more accurate prediction of one score based on another.

Table 11 summarizes the bi-directional regression equations of the CBCL and Ohio scale change scores. The last column displays the correlations between these two change scores for each of the four possible pairs. For the 33 children with complete intake and follow-up scores the Ohio scale change scores and the CBCL change scores were correlated between r = .03 and r = .39. The Ohio Problems scale change scores were more highly correlated with the CBCL change scores (.27 and .39 for the Parent and Worker forms respectively) than were the Ohio Functioning scale change scores. These correlations were modest but indicate the change scores are generally going in the correct directions across most test pairs. The Ohio Functioning change scores and the CBCL change scores had very small correlations (-.18 and .03 for the Parent and

Worker forms respectively). Recall that decreases in symptoms as measured by the CBCL should be associated with increases in Ohio Functioning scale scores so the correlations should be negative. Therefore the Worker Functioning change score is not accurate.

Bi-directional regression equations of the Ohio scales change scores as predictors of the CBCL change score and the CBCL change scores as predictors of the Ohio scales change scores are presented in Table 11. The Ohio Problems scale change score and the CBCL change score were modest predictors of one another. However, the change scores for the CBCL and the Ohio Functioning scale were relatively poor predictors of one another. Each row in the table can be converted into an equation for determining the corresponding scales change scores. For example the first row shows that to get a CBCL change score, just multiple .18 times the Parent Ohio Problems scale change score and subtract 4.58, (e.g. CBCL Change score = -4.58 + .18 x (Ohio Problems scale change score). This produces the expected size of a CBCL change score given a specific Ohio Problems scale change score.

SUMMARY

Reliability and convergent validity: Average reliability for the Ohio scales was in excess of .90 indicating excellent internal consistency. Inter-correlations between the various Ohio scales scores forms was also relatively high (.39 to .73 for the Ohio Problems scale scores and .43 to .72 for the Ohio Functioning scale scores). Correlations between the CBCL and the Ohio Problems scale scores ranged from .62 to .64 and for the Ohio Functioning scale scores ranged from -.52 to -.54. Correlations between the SDQ and the Ohio Problems scale scores ranged from .37 to .63 and for the Ohio Functioning scale scores ranged from -.28 to -.47.

Probable Ohio Clinical score ranges: Ohio Problems scale scores of 30 or above clearly indicate a clinical level of severity and scores of 12 and below clearly indicate a normal minimally symptomatic state. Given the standard deviation and means of both groups,

based on setting cutoff scores one standard deviation above the normal groups mean and one standard deviation below the clinical groups mean indicates that the range of 17 to 24 on the Ohio Problems scale would appear to be an area of borderline scores. This range is consistent with the means for the actual group of children who had borderline CBCL scores. Similarly for the Ohio Functioning scale, but setting cutoff scores a half standard deviation below the normal groups mean and a half standard deviation above the clinical groups mean, indicates that scores of greater than 54 indicate a normal functioning range and scores of less than 44 indicate a clinical functioning range, with 45 to 53 representing the borderline score range.

Ohio SED: The Standard Error of Differences is a measure of what constitutes a statistically significant difference between two test scores. The specific SED for the Ohio scales was calculated for the worker, parent and youth forms. However, across all forms, for the Ohio Problems scale a change of 11 points will generally indicate significant change and for the Ohio Functioning scale a change of 8 points will generally indicate significant change.

Ohio Principal Components analysis: Principal components analyses were conducted on the Ohio Problems scale and the Ohio Functioning scale to determine if there were any potentially coherent groups of items which could be used as subscales. The Ohio Problems scales revealed three clear subscales; internalizing symptoms, externalizing symptoms and delinquent behaviors. The internalizing and externalizing symptoms correlated with their CBCL internal and external subscale counterparts. The Ohio Functioning scale was unidimensional and did not have any clear subscales.

Intake to Follow-up Change scores: Only 33 participants from the initial intake sample had complete data available for both the CBCL and the Ohio scales at the 90 day follow-up period. On average, across the CBCL and the two Ohio scales, children exhibited a trend towards improved scores from intake to follow-up. Statistical tests revealed significant changes in the mean group scores of all children on the CBCL and for the Worker Ohio scales but not for the Parent Ohio scales. However, all scores on all

tests were changing in the predicted directions of clinical improvement. For the group means, effect sizes in this study ranged from slightly under average to large. Individual change scores were evaluated using each tests SED. Depending upon the particular test pair between 41% to 68% of the individuals exhibited significant change between intake and follow-up.

Conclusion: Results generally indicate that the Ohio scales have adequate reliability, validity and sensitivity to change. It appears that the Ohio scales can be substituted for the CBCL without creating substantial validity problems. The Ohio Problems scale is more closely related to the CBCL than the Ohio Functioning scale is. For most purposes it is suggested that for the time being the Ohio Problems scale, rather than the Ohio Functioning scale be used for most substitutions of CBCL scores with Ohio scale scores. However, it may be the case that participants also failed to fill out the Ohio Functioning scale correctly (the two scales are scored in reverse directions) so an examination of the initial data from the four pilot resiliency and disease management sites is needed.

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Table 1

Descriptive Statistics for Scales.

Variable	N	Mean	SD	P25	Median	P75	Raw Alpha
Ohio Problems scale							
Worker Form	732	27.4	17.1	14	26	39	.903
Parent Form	540	31.8	19.3	17	30	44	.906
Youth Form	252	14.2	14.3	4	10	19	.912
Ohio Functioning scale							
Worker Form	619	45.1	14.0	35	45	55	.927
Parent Form	447	42.9	15.8	32	43	54	.931
Youth Form	219	59.3	13.6	50	60	70	.916
Other Scales							
CBCL	711	65.9	12.2	59	68	74	
Parent SDQ Total Score	320	38.8	7.8	34	39	45	
Child SDQ Total Score	238	31.7	6.7	27	31	36	

Table 2

Correlations between the CBCL and SDQ with the Ohio Problems and Functioning scales.

	CBCL Total Score	Child SDQ Total Difficulties Score	Parent SDQ Total Difficulties Score
Ohio Scales	0.662	0.557	0.377
Problems	p < .001	p < .001	p < .001
Worker	671	228	301
Ohio Scales	0.643	0.435	0.637
Problems	p < .001	p < .001	p < .001
Parent	509	55	298
Ohio Scales	0.625	0.561	
Problems	p < .001	p < .001	
Youth	220	180	
Ohio Scales	-0.549	-0.473	-0.350
Functioning	p < .001	p < .001	p < .001
Worker	619	192	247
Ohio Scales	-0.533	-0.282	-0.494
Functioning	p < .001	p < .001	p < .001
Parent	447	45	235
Ohio Scales	-0.521	-0.427	-0.282
Functioning	p < .001	p < .001	p < .001
Youth	219	150	45

Table Note. Cells in the table above show the correlation between the scales, the statistical significance and the number of observations used to compute each correlation.

Table 3

Inter-correlations of Ohio Problem and Functioning scales scores.

	V1	V2	V3	V4	V5	V6
V1 Ohio Problems scale - Worker	1					
V2 Ohio Problems scale - Parent	.69	1				
V3 Ohio Problems scale - Youth	.73	.39	1			
V4 Ohio Functioning scale - Worker	-.70	-.56	-.33	1		
V5 Ohio Functioning scale - Parent	-.54	-.66	-.36	.72	1	
V6 Ohio Functioning scale - Youth	-.45	-.42	-.53	.57	.43	1

Table 4

Regressions of CBCL and Ohio Scales.

Dependent Variable	Constant	Coefficient	Predictor	RSQ	N
CBCL	57.77	0.35	Ohio Parent Symptoms	0.43	473
Ohio Parent Symptoms	-52.74	1.22	CBCL	0.43	473
CBCL	52.91	0.45	Ohio Worker Symptoms	0.39	638
Ohio Worker Symptoms	-28.76	0.87	CBCL	0.39	638
CBCL	48.97	0.52	Ohio Youth Symptoms	0.39	220
Ohio Youth Symptoms	-27.62	0.75	CBCL	0.39	220
CBCL	84.11	-0.35	Ohio Parent Functioning	0.28	425
Ohio Parent Functioning	97.67	-0.79	CBCL	0.28	425
CBCL	87.25	-0.49	Ohio Worker Functioning	0.30	598
Ohio Worker Functioning	85.77	-0.62	CBCL	0.30	598
CBCL	84.93	-0.47	Ohio Youth Functioning	0.27	219
Ohio Youth Functioning	92.07	-0.58	CBCL	0.27	219

Note. Children age 0 to 5 were excluded from these regression equations because the CBCL form they use is different. Only adolescents complete the Ohio Youth form so these regressions were not effected. The inclusion or exclusion of these children made virtually no difference in the regression equations.

Table 5

Summary of Ohio Problems and Functioning Scales by symptom group as defined by CBCL scores.

Group	Number	Scale	N	Mean	Std Dev
Normal	190	CBCL Total Score	190	49.71	8.06
		Ohio Problems scale - Worker	185	14.22	11.92
		Ohio Problems scale - Parent	85	13.65	12.95
		Ohio Problems scale - Youth	120	8.60	8.03
		Ohio Functioning scale - Worker	176	55.43	12.53
		Ohio Functioning scale - Parent	75	58.33	11.81
		Ohio Functioning scale - Youth	120	64.62	11.41
Borderline	73	CBCL Total Score	73	61.70	1.04
		Ohio Problems scale - Worker	67	22.51	13.51
		Ohio Problems scale - Parent	49	21.71	14.48
		Ohio Problems scale - Youth	37	15.27	11.29
		Ohio Functioning scale - Worker	66	49.50	12.37
		Ohio Functioning scale - Parent	40	50.23	14.10
		Ohio Functioning scale - Youth	36	56.72	12.52
Clinical	275	CBCL Total Score	275	69.54	3.01
		Ohio Problems scale - Worker	257	30.80	13.46
		Ohio Problems scale - Parent	224	29.88	13.62
		Ohio Problems scale - Youth	45	25.82	14.76
		Ohio Functioning scale - Worker	233	41.88	11.32
		Ohio Functioning scale - Parent	193	41.67	12.90
		Ohio Functioning scale - Youth	45	50.51	13.96
Severe	173	CBCL Total Score	173	79.76	4.89
		Ohio Problems scale - Worker	162	42.25	14.89
		Ohio Problems scale - Parent	151	47.66	18.13
		Ohio Problems scale - Youth	18	34.33	23.42
		Ohio Functioning scale - Worker	144	35.47	11.26
		Ohio Functioning scale - Parent	139	34.14	14.88
		Ohio Functioning scale - Youth	18	50.94	11.44

Table 6

Potential Ohio Problems scale and Functioning scale scores for defining groups.

	Ohio Problems scale	Ohio Functioning scale
Normal score range	< 16	54+
Borderline score range	17 to 24	45 to 53
Clinical score range	25+	> 44

Table 7

Size of change score differences required for significant change for the Ohio Scales.

	N	Mean	SD	Alpha	SEM	SED	Change scores
Ohio Problems scale							
Worker Form	732	27.4	17.1	.903	5.33	10.44	10
Parent Form	540	31.8	19.3	.906	5.92	11.60	12
Youth Form	252	14.2	14.3	.912	4.24	8.31	8
Ohio Functioning scale							
Worker Form	619	45.1	14.0	.927	3.78	7.41	7
Parent Form	447	42.9	15.8	.931	4.15	8.13	8
Youth Form	219	59.3	13.6	.916	3.94	7.73	8

Note. The data is from the initial intake sample (N = 775) collected at all 12 centers, not all persons had data for all scales so sample size varies for each scale.

Table 8

Varimax Rotated Principal Components for the Ohio Problems scale items for Worker, Parent and Youth Samples.

Item	Worker External Subscale	Worker Internal Subscale	Worker Delinq. Subscale	Parent External Subscale	Parent Internal Subscale	Parent Delinq. Subscale	Youth External Subscale	Youth Internal Subscale	Youth Delinq. Subscale
1	**0.84**	0.20	0.06	**0.83**	0.20	-0.01	**0.80**	0.25	0.16
2	**0.76**	0.14	0.10	**0.75**	0.19	0.04	**0.62**	0.18	0.26
3	**0.84**	0.23	0.06	**0.84**	0.15	0.04	**0.79**	0.32	0.05
4	**0.82**	0.27	0.07	**0.79**	0.27	0.13	**0.70**	0.33	0.00
5	**0.81**	0.14	0.24	**0.82**	0.16	0.18	**0.63**	0.24	0.41
6	**0.79**	0.18	0.24	**0.83**	0.19	0.12	**0.64**	0.21	0.41
7	0.01	0.05	**0.81**	-0.08	0.12	**0.78**	0.11	0.11	**0.81**
8	0.44	0.13	**0.70**	0.45	0.06	**0.65**	0.33	0.11	**0.76**
9	0.09	0.00	**0.78**	0.06	0.09	**0.76**	0.16	0.04	**0.81**
10	**0.58**	0.11	0.39	**0.61**	0.17	0.37	**0.66**	0.18	0.26
11	**0.61**	0.17	-0.23	**0.65**	0.20	-0.18	**0.54**	0.37	0.09
12	0.21	**0.53**	0.22	0.24	**0.50**	0.25	0.24	**0.56**	0.08
13	0.11	**0.67**	0.22	0.12	**0.67**	0.20	0.30	**0.68**	0.12
14	0.22	**0.79**	0.16	0.16	**0.79**	0.10	0.46	**0.72**	0.14
15	0.16	**0.77**	0.00	0.20	**0.76**	-0.02	0.29	**0.67**	-0.10
16	0.20	**0.76**	-0.06	0.22	**0.79**	-0.02	0.18	**0.75**	0.03
17	0.13	**0.74**	0.05	0.05	**0.79**	0.06	0.25	**0.70**	0.19
18	0.17	**0.79**	0.16	0.22	**0.77**	0.17	0.28	**0.70**	0.17
19	0.10	**0.59**	-0.10	0.11	**0.66**	0.00	0.06	**0.63**	0.02
20	0.11	**0.54**	-0.12	0.23	**0.41**	-0.01	0.10	**0.50**	0.11

Note. Boldface items indicated the highest principal component loading for each item. The cumulative percentage of variance accounted for by the first three initial components were Worker (59.9%), Parent (59.4%) and Youth (57.6%). The first five eigenvalues for the initial components were Worker (7.36, 2.89, 1.82, 0.95, 0.80), Parent (7.45, 2.72, 1.71, 0.97, 0.84) and Youth (8.11, 2.17, 1.23, 1.01, 0.94).

Table 9

Correlations of Ohio Problems subscales with CBCL total score and CBCL subscale scores.

Ohio Problems subscales	CBCL Total Score	CBCL Internalizing Subscale	CBCL Externalizing Subscale
Parent internal	r = 0.56	**r = 0.61**	r = 0.32
	n = 451	n = 450	n = 451
Worker internal	r = 0.48	**r = 0.54**	r = 0.31
	n = 642	n = 640	n = 642
Youth internal	r = 0.58	**r = 0.59**	r = 0.46
	n = 216	n = 216	n = 216
Parent external	r = 0.53	r = 0.24	**r = 0.61**
	n = 451	n = 450	n = 451
Worker external	r = 0.60	r = 0.36	**r = 0.64**
	n = 642	n = 640	n = 642
Youth external	r = 0.56	r = 0.42	**r = 0.60**
	n = 216	n = 216	n = 216
Parent delinquent	r = 0.20	r = 0.10	**r = 0.30**
	n = 451	n = 450	n = 451
Worker delinquent	r = 0.16	r = 0.07	**r = 0.22**
	n = 642	n = 640	n = 642
Youth delinquent	r = 0.31	r = 0.24	**r = 0.38**
	n = 216	n = 216	n = 216

Note. The correlation between the specific Ohio Problems subscales and the CBCL is indicated by “r =”, while the number of pairs of observations for each correlation is indicated by the “n =”. The highest correlation for each row is in boldface.

Table 10

Mean Scores for the CBCL and Ohio Scales from Intake to Follow-up by Ohio scale and form type.

	Intake Score	Follow-up Score	Average Change	Means Test	Effect Size	Significant Change
CBCL N = 27	67.5 (SD = 7.6)	61.9 (SD = 10.3)	-5.6 (SD = 9.0)	t = 3.24 p < .001	d = .73	52% N = 14
Ohio Problems Parent N = 27	29.6 (SD = 17.6)	24.1 (SD = 13.9)	-5.6 (SD = 19.1)	t = 1.49 p = .147	d = .31	44% N = 12

	Intake Score	Follow-up Score	Average Change	Means Test	Effect Size	Significant Change
CBCL N = 22	69.1 (SD = 7.8)	62.8 (SD = 11.0)	-6.3 (SD = 9.5)	t = 3.08 p < .001	d = .62	45% N = 10
Ohio Functioning Parent N = 22	41.6 (SD = 13.6)	47.0 (SD = 16.6)	+ 5.3 (SD = 20.9)	t = -1.19 p = .246	d = -.39	41% N = 9

	Intake Score	Follow-up Score	Average Change	Means Test	Effect Size	Significant Change
CBCL N = 22	69.1 (SD = 8.0)	62.6 (SD = 9.2)	-6.5 (SD = 9.1)	t = 3.38 p < .01	d = .82	64% N = 14
Ohio Problems Worker N = 22	32.0 (SD = 12.6)	16.3 (SD = 10.3)	-15.6 (SD = 14.5)	t = 5.07 p < .001	d = 1.24	68% N = 15

	Intake Score	Follow-up Score	Average Change	Means Test	Effect Size	Significant Change
CBCL N = 20	69.1 (SD = 8.1)	63.1 (SD = 9.0)	-6.1 (SD = 7.1)	t = 2.89 p < .01	d = .75	60% N = 12
Ohio Functioning Worker N = 20	37.8 (SD = 9.2)	48.9 (SD = 14.1)	+ 11.1 (SD = 12.5)	t = -3.00 p < .01	d = -1.21	50% N = 10

	Intake Score	Follow-up Score	Average Change	Means Test	Effect Size	Significant Change
CBCL N = 33	68.2 (SD = 7.9)	62.3 (SD = 9.6)	-5.9 (SD = 8.4)	t = 4.01 p < .001	d = .76	58% N = 19

Note. Significant improvement indicates individuals with change scores from intake to follow-up that meet or exceed the Standard Error of Differences (SED) for each test. For the CBCL the SED is a decrease of 5 or more points, for the Ohio Problems scale it is a decrease of 10 or more points, and for the Ohio Functioning scale it is a increase of 8 or more points.

Table 11

Bi-directional change score regressions of the CBCL and Ohio Problems scale and Functioning scale.

Dependent Variable	Constant	Coefficient	Predictor	RSQ	N	r
CBCL change score	-4.58	0.18	Parent Ohio Problems change score	0.15	27	0.39
CBCL change score	-5.85	-0.08	Parent Ohio Functioning change score	0.03	22	-0.18
CBCL change score	-3.85	0.17	Worker Ohio Problems change score	0.08	22	0.27
CBCL change score	-6.22	0.02	Worker Ohio Functioning change score	0.00	20	0.03
Parent Ohio Problems change score	-0.85	0.83	CBCL change score	0.15	27	0.39
Parent Ohio Functioning change score	2.78	-0.40	CBCL change score	0.03	22	-0.18
Worker Ohio Problems change score	-12.77	0.44	CBCL change score	0.08	22	0.27
Worker Ohio Functioning change score	11.34	0.05	CBCL change score	0.00	20	0.03

Appendix A

Mean CBCL and Ohio scale scores by Sex.

Sex	N Obs	Variable	N	Mean	SD	Min	Max
Female	227	CBCL Total Score	215	69.0	10.1	37	92
		Worker Ohio Problems scale	213	32.3	17.3	0	86
		Parent Ohio Problems scale	211	32.0	20.1	0	89
		Youth Ohio Problems scale	37	21.7	21.3	0	83
		Worker Ohio Functioning scale	191	43.7	14.2	0	78
		Parent Ohio Functioning scale	176	44.9	16.1	6	78
		Youth Ohio Functioning scale	36	55.5	13.2	33	79
Male	506	CBCL Total Score	455	64.0	12.8	23	100
		Worker Ohio Problems scale	485	25.0	16.7	0	83
		Parent Ohio Problems scale	292	31.6	19.0	0	93
		Youth Ohio Problems scale	215	12.9	12.3	0	74
		Worker Ohio Functioning scale	407	45.9	14.0	5	80
		Parent Ohio Functioning scale	249	41.6	15.4	5	80
		Youth Ohio Functioning scale	183	60.1	13.6	15	80

Note. Children age 0 to 5 excluded.

Appendix B

Mean CBCL and Ohio scale scores by Age Group.

Age Group	N Obs	Variable	N	Mean	SD	Min	Max
0 to 5	42	CBCL Total Score	41	71.0	12.5	41	94
		Worker Ohio Problems scale	34	31.2	13.3	6	60
		Parent Ohio Problems scale	37	33.0	17.6	6	80
		Youth Ohio Problems scale	0	.	.	.	.
		Worker Ohio Functioning scale	21	40.6	11.6	16	66
		Parent Ohio Functioning scale	22	40.8	17.5	4	78
		Youth Ohio Functioning scale	0	.	.	.	.
06 to 12	222	CBCL Total Score	209	70.3	10.1	34	100
		Worker Ohio Problems scale	215	31.4	14.5	0	83
		Parent Ohio Problems scale	198	34.8	18.0	1	85
		Youth Ohio Problems scale	15	22.3	15.8	0	54
		Worker Ohio Functioning scale	177	42.2	11.3	5	80
		Parent Ohio Functioning scale	156	40.1	13.4	5	74
		Youth Ohio Functioning scale	14	53.7	14.7	37	80
13 to 17	511	CBCL Total Score	461	63.5	12.5	23	100
		Worker Ohio Problems scale	483	25.3	18.0	0	86
		Parent Ohio Problems scale	305	29.8	20.1	0	93
		Youth Ohio Problems scale	237	13.7	14.1	0	83
		Worker Ohio Functioning scale	421	46.5	14.9	0	80
		Parent Ohio Functioning scale	269	44.7	16.8	6	80
		Youth Ohio Functioning scale	205	59.7	13.4	15	80

Appendix C

Mean CBCL and Ohio scale scores by Ethnicity.

Ethnicity	N Obs	Variable	N	Mean	SD	Min	Max
Black	150	CBCL Total Score	132	62.4	13.2	23	90
		Worker Ohio Problems scale	144	21.6	16.0	0	83
		Parent Ohio Problems scale	73	33.7	18.9	0	84
		Youth Ohio Problems scale	81	13.8	13.5	0	74
		Worker Ohio Functioning scale	120	47.7	13.8	0	78
		Parent Ohio Functioning scale	57	43.6	16.4	12	79
		Youth Ohio Functioning scale	70	60.4	12.6	31	80
Hispanic	391	CBCL Total Score	365	65.5	12.6	25	100
		Worker Ohio Problems scale	371	27.6	17.8	0	86
		Parent Ohio Problems scale	273	29.2	20.1	0	93
		Youth Ohio Problems scale	136	14.5	14.7	0	83
		Worker Ohio Functioning scale	324	44.8	14.4	7	80
		Parent Ohio Functioning scale	232	44.2	16.5	5	80
		Youth Ohio Functioning scale	118	57.7	14.0	15	80
White	184	CBCL Total Score	165	68.8	9.5	35	89
		Worker Ohio Problems scale	176	31.1	15.8	3	69
		Parent Ohio Problems scale	152	35.2	18.1	0	76
		Youth Ohio Problems scale	32	14.9	15.3	0	70
		Worker Ohio Functioning scale	148	43.6	13.0	15	80
		Parent Ohio Functioning scale	131	40.6	14.0	6	76
		Youth Ohio Functioning scale	28	61.3	13.4	31	80

Note. Children age 0 to 5 excluded.

Appendix D

Mean CBCL and Ohio scale scores by Diagnostic group.

Diagnostic Group	N Obs	Variable	N	Mean	SD	Min	Max
Anxiety	22	CBCL Total Score	22	70.5	8.5	57	89
		Worker Ohio Problems scale	21	29.7	14.6	11	61
		Parent Ohio Problems scale	19	28.8	16.2	10	64
		Youth Ohio Problems scale	3	29.7	16.0	14	46
		Worker Ohio Functioning scale	18	48.9	11.4	28	67
		Parent Ohio Functioning scale	15	48.1	9.9	33	62
		Youth Ohio Functioning scale	3	44.7	1.5	43	46
Attention Deficit	163	CBCL Total Score	153	68.9	9.5	39	89
		Worker Ohio Problems scale	158	30.3	15.8	3	83
		Parent Ohio Problems scale	139	35.0	18.7	3	84
		Youth Ohio Problems scale	27	17.4	12.9	0	48
		Worker Ohio Functioning scale	133	42.2	12.8	5	80
		Parent Ohio Functioning scale	114	38.0	14.2	6	74
		Youth Ohio Functioning scale	27	56.2	13.0	31	80
Bipolar Disorder	34	CBCL Total Score	30	71.7	10.6	48	92
		Worker Ohio Problems scale	33	32.7	16.6	0	60
		Parent Ohio Problems scale	31	32.8	21.9	2	76
		Youth Ohio Problems scale	7	28.7	29.3	1	83
		Worker Ohio Functioning scale	28	38.8	16.3	0	76
		Parent Ohio Functioning scale	26	42.0	17.4	9	76
		Youth Ohio Functioning scale	7	56.3	15.6	38	78
Conduct Disorder	191	CBCL Total Score	167	60.7	14.2	23	100
		Worker Ohio Problems scale	184	21.6	16.9	0	74
		Parent Ohio Problems scale	82	30.6	18.3	0	93
		Youth Ohio Problems scale	106	10.6	11.7	0	74
		Worker Ohio Functioning scale	157	47.7	14.2	8	79
		Parent Ohio Functioning scale	70	41.6	14.7	8	75
		Youth Ohio Functioning scale	88	62.3	12.7	15	80
Major Depression	82	CBCL Total Score	77	68.9	8.3	37	86
		Worker Ohio Problems scale	75	34.3	15.7	3	86
		Parent Ohio Problems scale	68	31.7	18.6	4	86
		Youth Ohio Problems scale	10	19.6	12.9	5	43

Diagnostic Group	N Obs	Variable	N	Mean	SD	Min	Max
		Worker Ohio Functioning scale	66	41.6	11.5	13	66
		Parent Ohio Functioning scale	57	43.5	14.1	11	67
		Youth Ohio Functioning scale	9	52.4	18.4	16	72
Other Mood	108	CBCL Total Score	101	67.0	10.8	39	89
		Worker Ohio Problems scale	103	32.4	18.7	0	85
		Parent Ohio Problems scale	88	30.4	20.8	0	89
		Youth Ohio Problems scale	32	22.0	18.5	2	70
		Worker Ohio Functioning scale	90	45.1	14.8	7	80
		Parent Ohio Functioning scale	74	48.7	16.4	12	80
		Youth Ohio Functioning scale	29	56.2	14.0	31	79

Note. Children age 0 to 5 excluded. These six major diagnostic groups account for approximately 80% of all the children served. Children with other diagnoses were excluded.

Appendix E
Mean score differences by CBCL form type.

CBCL Test Form	N	Mean	SD	Min	Max
CBCL	517	69.0	10.3	23	100
CBCL1 ½ to 5	41	71.0	12.5	41	94
YSR	153	54.0	11.0	25	76

Note. The CBCL was completed by Parents for Youth age 6 to 17. All CBCL's completed for children under age six (ages 0 to 5) are presumed to be the appropriate CBCL 1 ½ to 5 year old form. The YSR (Youth Self Report) was completed primarily by youth age 13 to 17 (144 out of 153).

Appendix F
Correlations between the CBCL and the Ohio Scales by Age and Test Form.

	Parent CBCL Under age 5	All CBCL Age 6 to 17	Regular CBCL Age 6 to 17	YSR CBCL Age 6 to 17
Worker Ohio Problems scale	r = 0.59	r = 0.62	r = 0.50	r = 0.64
	p < .01	p < .01	p < .01	p < .01
	n = 33	n = 638	n = 493	n = 145
Parent Ohio Problems scale	r = 0.50	r = 0.66	r = 0.66	
	p < .01	p < .01	p < .01	.
	n = 36	n = 473	n = 471	n = 2
Youth Ohio Problems scale	.	r = 0.63	r = 0.47	r = 0.71
	.	p < .01	p < .01	p < .01
	0	n = 220	n = 71	n = 149
Worker Functioning scale	r = -0.48	r = -0.55	r = -0.44	r = -0.49
	p < .05	p < .01	p < .01	p < .01
	n = 21	n = 598	n = 454	n = 144
Parent Ohio Functioning scale	r = -0.68	r = -0.52	r = -0.53	
	p < .01	p < .01	p < .01	.
	n = 22	n = 425	n = 423	n = 2
Youth Functioning scale	.	r = -0.52	r = -0.39	r = -0.54
	.	p < .01	p < .01	p < .01
	n = 0	n = 219	n = 70	n = 149

Note. Abbreviations are as follows, r = correlation, p = statistically significant probability value, and n = number of observations for each correlation.