Analogue Measures of *DSM-IV* Mood and Anxiety Disorders Based on Behavior Checklists

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Although symptom checklists are commonly used to assess child psychopathology, confusion arises due to differences between empirically derived checklist syndromes and rationally derived *DSM-IV* diagnostic categories. This paper explores analogue measures of *DSM-IV* mood and anxiety disorders created using items from the Youth Self-Report and Child Behavior Checklist (T. M. Achenbach, 1991a, 1991b) that parallel *DSM-IV* symptoms. In a matched sample of clinically referred and nonreferred adolescents, analogue measures demonstrated expected patterns of age differences, sex differences, and comorbidity. Meeting criteria for an analogue diagnosis was also associated with referral for mental health services and poor social competence. Informant effects are highlighted and the potential benefits and limitations of using existing behavior checklists to assess *DSM* disorders are discussed. These findings suggest the utility of checklists in identifying analogues of anxiety and mood disorders in children and adolescents.

KEY WORDS: depression; Child Behavior Checklist; diagnosis.

Behavior checklists such as the Child Behavior Checklist (CBCL; Achenbach, 1991a) and Youth Self-Report (YSR; Achenbach, 1991b) are popular assessment tools for clinicians and researchers because they are cost effective, can be completed quickly, assess a broad range of psychopathology, and can be administered and scored by nonprofessionals. Furthermore, the CBCL and YSR have served as the basis for an empirically derived taxonomy of child and adolescent psychopathology that discriminates well between referred and nonreferred populations (Achenbach, 1991a, 1991b, 1991c). However, concerns have been raised regarding the imperfect correspondence between the symptoms included in the empirically derived syndromes and the symptoms defining disorders in the *Diagnostic and Statistical Manual*, Fourth Edition (*DSM-IV*; American Psychiatric Association [APA], 1994).

One of the most notable examples is the Anxious/Depressed syndrome, consisting of items that do not directly correspond to any *DSM-IV* mood or anxiety disorder (Compas, Ey, & Grant, 1993). Although high scores on the empirically derived Anxious/Depressed syndrome predict *DSM* mood disorders, the clinical cutoff for the syndrome identifies a somewhat different group than that identified by interview-based diagnoses of depression (e.g., Compas & Oppedisano, 2000; Gerhardt, Compas, Connor, & Achenbach, 1999). This imperfect overlap between syndrome and disorder is not surprising given that the syndrome assesses a mixture of mood and anxiety symptoms and does not assess the somatic symptoms of mood disorders, such as appetite and sleep disturbance. The goal of this study was to explore the feasibility of generating checklist-based "analogue" measures of major depressive disorder (MDD), dysthymia (DYS), and generalized anxiety disorder (GAD) by recombining items from CBCL and YSR to create scales that parallel *DSM-IV* disorders.

Unlike the Anxious/Depressed syndrome, other empirically derived syndromes have demonstrated strong correspondence with diagnostic interviews. For example, the CBCL/YSR Attention Problems syndrome, consisting

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of symptoms closely matching *DSM* criteria, does an excellent job of discriminating between youth who meet criteria for some form of attention deficit disorder and those who do not (Chen, Faraone, Biederman, & Tsuang, 1994; Eiraldi, Power, Karustis, & Goldstein, 2000), even in samples with comorbid major depression (Biederman, Faraone, Mick, Moore, & Lelon, 1996). Thus, it seems likely that analogue measures of mood and anxiety disorders consisting of checklist items directly matching *DSM-IV* symptoms will more closely resemble *DSM-IV* disorders than do empirically derived syndromes. Several studies have explored combinations of CBCL and YSR items designed to resemble more closely *DSM* mood and anxiety disorders (Achenbach & Rescorla, 2001; Bowen, Offord, & Boyle, 1990; Clarke, Lewinsohn, Hops, & Seeley, 1992; Fleming, Offord, & Boyle, 1989; Lengua, Sadowski, Friedrich, & Fisher, 2001; Nurcombe et al., 1989; Seifer, Nurcombe, Scioli, & Grapentine, 1989). Although these scales have successfully discriminated between youth with and without diagnoses of depression (Clarke et al., 1992; Lengua et al., 2001; Rey & Morris-Yates, 1992), existing scales have either included items that do not directly correspond to DSM symptoms (Achenbach & Rescorla, 2001; Clarke et al., 1992; Lengua et al., 2001; Nurcombe et al., 1989), or have required the addition of items to the CBCL and YSR (Fleming et al., 1989). Further, no one has tested analogue measures for DYS or GAD.

The creation of checklist-based diagnostic analogues based entirely on CBCL and YSR items would be advantageous because paper-and-pencil assessment is faster and more economical than clinical interviews. Although a checklist cannot supplant clinical interviews, it would be useful to be able to screen accurately for *DSM* disorders using analogue diagnostic information from popular checklists. CBCL and YSR are particularly well suited for use as screening tools, as they are widely used in research and clinical settings and assess a broad range of internalizing and externalizing problems. In addition, the creation of *DSM* analogue scales based on the CBCL and YSR would be helpful because the ability to compare empirically derived syndromes and rationally derived *DSM* disorders within a single measure may facilitate understanding of relations between empirically and rationally derived taxonomies.

To be useful, a checklist-based analogue measure should accomplish three goals. First, analogues should parallel *DSM-IV* symptoms and diagnostic criteria. Many previous MDD analogues have included symptoms that do not match *DSM* symptoms of MDD, such as "worries" and "withdrawn," failed to require the presence of core symptoms, such as sadness (e.g., Clarke et al., 1992;

Nurcombe et al., 1989), or failed to assess key symptoms, such as appetite disruption, poor concentration, or irritability (e.g., Achenbach & Rescorla, 2001; Lengua et al., 2001). Additionally, most measures have been continuous, rather than categorical, and have scored similar items separately (e.g., "overtired," "sleeps less than most children," and "trouble sleeping"), inflating the impact of a single *DSM* symptom of mood disorders (e.g., Clarke et al., 1992; Lengua et al., 2001). Second, analogue measures should produce expected patterns of age differences, sex differences, and comorbidity. Thus far, the diagnostic patterns associated with analogues of MDD, DYS, and GAD have not been explored, although one MDD analogue has produced the expected prevalence of MDD in a community sample (Fleming et al., 1989). Third, analogue measures should satisfy the *DSM-IV* requirement that diagnosis of mood or anxiety disorders be associated with significant distress or functional impairment (APA, 1994). Individuals meeting symptom criteria for an analogue-based diagnosis should show markers of distress, such as referral for clinical services, poor academic functioning, or impaired social competence. Although a previous MDD analogue has predicted referral for mental health services, poor school performance, and relationship problems (Bowen et al., 1990; Fleming et al., 1989), no information is available about analogues for DYS or GAD.

Building on previous attempts to generate checklist derived analogues, this study explored the properties of *DSM-IV* analogues for MDD, DYS, and GAD created using items only from YSR and CBCL. In order to provide the best possible match to *DSM-IV* criteria, analogue diagnoses required the presence of core symptoms and were categorical rather than continuous. The ability of analogues to produce expected age differences, sex differences, and patterns of comorbidity was tested in matched samples of clinically referred and nonreferred adolescents. MDD and DYS analogues were expected to replicate interview-based findings that rates of depressive disorders are higher for girls than for boys and increase during adolescence, with age and sex differences most pronounced in clinical samples (Angold & Rutter, 1992; McGee et al., 1990; Nolen-Hoeksema & Girgus, 1994; Petersen, Sarigiani, & Kennedy, 1991). Predictions for the GAD analogue were more difficult, as few studies have investigated GAD in adolescents. One found no evidence of sex differences in the prevalence of GAD (Verhulst, van der Ende, Ferdinand, & Kasius, 1997). However, another found higher rates for girls (Whitaker et al., 1990), consistent with findings that rates of most anxiety disorders are higher for girls and younger adolescents (Bird, Gould, & Staghezza, 1993; Breton et al., 1999; Kashani & Orvaschel, 1990; Lewinsohn, Gotlib,

Lewinsohn, Seeley, & Allen, 1998). Comorbidity of mood disorder and GAD analogues was expected to be high, as approximately 40% of youth diagnosed with a mood disorder also meet criteria for an anxiety disorder, and vice versa, with comorbidity ranging from 28 to 70% (Kovacs, Gatsonis, Paulauskas, & Richards, 1989; Last, Strauss, & Francis, 1987; Nottelmann & Jensen, 1995; Strauss, Last, Hersen, & Kazdin, 1988). Additionally, an association was expected between analogue diagnoses and referral for clinical services and analogue diagnoses and lower social competence.

METHOD

Participants

Clinically Referred Sample

A sample of clinically referred adolescents, aged 11–18, was recruited from mental health clinics throughout the eastern, southern, and midwestern United States (Achenbach, 1991a, 1991b). Parent data on 1,075 adolescents were collected from 52 mental health settings and youth self-report data from 1,054 adolescents were collected at 26 settings. The referred sample was 50% female, and 75% non-Hispanic White, 14% African American, 8% Hispanic, and 3% biracial or other.

Nonreferred Sample

A group of adolescents who had not been referred for clinical services or special education classes in the past year was demographically matched to the clinically referred adolescents based on sex, age, ethnicity, and Hollingshead's SES (Hollingshead, 1975). These nonreferred participants were drawn from a nationally representative community sample recruited by Temple University's Institute for Survey Research as part of a longitudinal study of developmental psychopathology (Achenbach, 1991a). The matched, nonreferred sample consisted of parent reports on 1075 adolescents and youth self-reports from 1054 adolescents. The nonreferred sample was 50% female, and 75% non-Hispanic White, 17% African American, 6% Hispanic, and 2% biracial or other.

Measures

Categorical checklist-based analogue measures were created for three *DSM-IV* disorders: major depressive disorder (MDD), dysthymia (DYS), and generalized anxiety disorder (GAD). Symptoms for these disorders were assessed through parent reports on the CBCL (Achen-

bach, 1991a) and adolescent self-reports on the YSR (Achenbach, 1991b). The CBCL and YSR are well suited to the generation of analogue measures of *DSM-IV* disorders as they are among the most widely used instruments for the assessment of child and adolescent psychopathology (Berube & Achenbach, 2001) and have shown good reliability and validity (Achenbach, 1991a, 1991b). CBCL and YSR items assessing emotional and behavioral problems are scored according to a 3-point scale: 0 = *not true*; 1 = *somewhat or sometimes true*, and 2 = *very true or often true*. The CBCL and YSR also contain social competence scales assessing family and peer relations, participation in activities, and academic success.

Analogue measures were created by including checklist items rated by at least four of six doctoral students in clinical psychology as corresponding to a *DSM-IV* symptom. Because *DSM* diagnoses require a decision about whether a symptom is present or absent, checklist responses were dichotomized. A symptom was considered present if one or more of the checklist items matching the *DSM-IV* symptom was endorsed as "very true or often true." For multifaceted symptoms, a score of 2 on any one of the related checklist items resulted in the symptom being scored as present. For example, for the MDD symptom of sleep disturbance, a score of 2 on any one of the checklist items "sleeps more than others," "sleeps less than others," or "trouble sleeping" led to the symptom being scored as present. Specific criteria used to create each analogue are explained below.

Major Depressive Disorder Analogue

The MDD analogue (see Table I) required the presence of depressed or irritable mood plus four of the six additional symptoms of appetite disturbance, sleep disturbance, fatigue or lethargy, feelings of worthlessness or guilt, difficulty concentrating, and suicidal ideation or attempts. Neither the YSR nor CBCL provided items matching the *DSM-IV* symptom of anhedonia, and the YSR did not include an item assessing irritable mood. Although this led to fewer possible *DSM* symptoms, the number of symptoms required for diagnosis was not decreased. This helped to maintain the closest possible match to diagnostic criteria and to avoid overestimating the number of youth meeting criteria.[5]

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[5]The availability of an anhedonia item would have allowed a more exact match to *DSM* criteria. However, in a sample of over 1,200 youth, with the exception of suicidal ideation, anhedonia was the least common MDD symptom, appearing in only 5.6% of the population (Roberts, Lewinsohn, & Seeley, 1995), suggesting that the absence of this symptom may not greatly affect prevalence rates.

Table I. Diagnostic Criteria for Major Depressive and Dysthymic Disorders and Corresponding CBCL and YSR Analogue Items

MDD criteria	Dysthymia criteria	YSR & CBCL analogue ttems
Depressed or irritable mood	Depressed or irritable mood	Stubborn, sullen, or irritable[a]
		Sad, unhappy, depressed
Loss of interest or pleasure	—	—
Weight loss or gain, increase or decrease in appetite	Poor appetite or overeating	Doesn't eat well
		Overeating
Insomnia or hypersomnia	Insomnia or hypersomnia	Sleeps less than most children
		Sleeps more than most children
		Trouble sleeping
Psychomotor agitation or retardation	—	Can't sit still, restless
Fatigue or loss of energy	Low energy or fatigue	Overtired
		Underactive, slow moving, lacks energy
Feelings of worthlessness or excessive/inappropriate guilt	—	Feels worthless or inferior
		Feels too guilty
Diminished ability to think or concentrate, indecisiveness	Poor concentration, difficulty making decisions	Can't concentrate or pay attention
Recurrent thoughts of death, suicidal ideation, attempt	—	Deliberately harms self, attempts suicide
		Thinks/talks about killing self
—	Low self-esteem	Feels worthless or inferior
—	Feelings of hopelessness	

[a] CBCL only.

Dysthymia Analogue

The DYS analogue (see Table I) required the presence of depressed/irritable mood plus two of the five auxiliary symptoms of appetite disturbance, sleep problems, fatigue/lethargy, poor concentration, and low self-esteem. Neither measure provided an item assessing feelings of hopelessness, and as above, the YSR did not include an item assessing irritability.

Generalized Anxiety Disorder Analogue

A diagnosis of GAD (see Table II) requires that an individual experience anxiety and worry most days about a number of events or activities, and that the person find it difficult to control this worry. In addition, for adolescents at least one additional symptom of restlessness, fatigue, difficulty concentrating, irritability, muscle tension, or sleep disturbance must be present. Neither the YSR nor the CBCL contains items directly assessing difficulty controlling worry. Thus, to ensure that problems with anxiety and worry were pervasive, the GAD analogue required that informants endorse *very true or often true* for *both* of the checklist items related to anxiety or worry, in addition to one or more of the auxiliary symptoms.

RESULTS

The mean number of analogue symptoms reported in each sample and internal consistencies for analogue scales are reported in Table III. Overall, across disorders,

Table II. Diagnostic Criteria for Generalized Anxiety Disorder and Corresponding CBCL and YSR Analogue Items

DSM symptom	YSR & CBCL analogue items
Anxiety and worry more days than not for at least 6 months about a number of events or activities	Too fearful or anxious
	Worries (both items must be endorsed)
Difficulty controlling the worry	—
Restlessness or feeling keyed up, on edge	Nervous, highstrung, or tense
	Trouble sitting still
Being easily fatigued	Overtired
	Underactive, slow moving, lacks energy
Difficulty concentrating or mind going blank	Trouble concentrating or paying attention
Irritability	Stubborn, sullen, or irritable[a]
Muscle tension	—
Sleep disturbance (difficulty falling or staying asleep or restless sleep).	Sleeps less than most children
	Sleeps more than most children
	Trouble sleeping

[a] CBCL only.

Table III. Mean Number of Analogue Symptoms and Internal Consistency by Informant and Sample

Analogue	Youth self-report		Parent report	
	Mean # of sxs (SD)	Internal consistency	Mean # consistency	Internal
Clinical sample				
MDD	1.9 (1.9)	.70	1.8 (1.7)	.62
DYS	1.5 (1.5)	.66	1.5 (1.5)	.59
GAD	1.0 (1.1)	.57	.99 (1.1)	.47
Nonreferred sample				
MDD	.83 (1.2)	.58	0.39 (0.86)	.58
DYS	.68 (1.0)	.57	0.31 (0.74)	.56
GAD	.46 (.79)	.45	0.20 (0.53)	.42

informants, and samples, the internal consistencies of analogue scales were low to moderate, with Kuder–Richardson coefficients ranging from .42 to .70. Although it would have been possible to improve internal consistency by dropping some items, this was not done in order to preserve the best match to *DSM-IV* criteria. In interpreting internal consistency of the analogue scales, it is important to consider the small number of items on each scale (range of 5–8 items), the dichotomous scoring of each item, and the fact that each item assesses a separate and very distinct symptom (e.g., appetite disruption, suicidality). In comparison, internal consistencies for the 14-item Anxious/Depressed syndrome were .78 on the YSR and .84 on the CBCL.

Prevalence of Analogue Disorders in the Clinical and Nonreferred Samples

Based on the self-report in the clinical sample, 7.8% of adolescents met criteria for the MDD analogue, 12.5% for the DYS analogue, and 8.5% for the GAD analogue. Rates of analogue diagnoses were similar for parent report, with 8.0% meeting criteria for MDD, 20% for DYS, and 5.3% for GAD. As expected, rates of analogue diagnoses were far lower in the nonreferred sample. According to youth report, 0.9% met criteria for MDD, 2.1% for DYS, and 2.2% for GAD. Rates for parent report were 0.5% for MDD, 2.0% for DYS, and 0.1% for GAD. Across all informants and samples, rates of MDD were lower than rates for DYS, suggesting that analogue diagnoses captured the differences in severity of the two disorders. However, all those meeting criteria for MDD also met criteria for DYS, suggesting imperfect discrimination between the two analogue diagnoses. Figure 1 presents analogue diagnoses based on youth-report data, and Fig. 2 presents parent-report data.

Comorbidity in the Referred Sample

Overlap with GAD was greater for individuals meeting criteria for the MDD than the DYS analogue, at 52% vs. 38% according to youth report and 22% vs. 18% based on parent report, once again supporting differences in severity between the MDD and DYS analogues. Of individuals meeting criteria for the GAD analogue, 50% had a comorbid mood disorder according to youth report, and 66% according to parent report. These levels are similar to rates of comorbidity found in previous studies of clinical samples.

Age, Sex, and Referral Status Differences

Three sets of ANOVAs were performed to test age, sex, and referral status effects for each analogue. For youth reports on the MDD analogue, there were significant main effects for sex, $F(1, 2076) = 9.0, p < .003$, and referral status, $F(1, 2076) = 39.3, p < .0001$, with girls and referred youth more likely to meet MDD analogue criteria. A significant Age × Referral Status interaction, $F(7, 2076) = 2.2, p < .04$, indicated that MDD increased with age only in clinically referred youth. Additionally, a Sex × Referral Status interaction, $F(1, 2076) = 9.5, p < .002$, indicated that referred girls were more likely to meet criteria for MDD than nonreferred girls, referred boys, and nonreferred boys. For parent reports, there were no age or sex differences, but there was a significant main effect for referral status, $F(1, 2118) = 53.4, p < .0001$, with referred youth more likely to meet criteria for the MDD analogue.

For the DYS analogue, analyses of youth reports revealed significant main effects for sex, $F(1, 2076) = 16.5, p < .0001$, and referral status, $F(1, 2076) = 53.6, p < .0001$. As with the MDD analogue, girls and referred youth were more likely to meet DYS analogue criteria. Once again, the only significant effect for parent report was referral status, $F(1, 2118) = 130.1, p < .0001$. For the GAD analogue, no age or sex effects were found for either youth or parent report. The main effect of referral status was significant for both youth and parent report, $F(1, 2076) = 19.1, p < .0001$, and $F(1, 2118) = 53.1, p < .0001$, respectively.

Relations Between Analogue Diagnosis and Referral Status

To understand better the risk associated with an analogue diagnosis, odds ratios were calculated to assess the likelihood of referral for clinical services
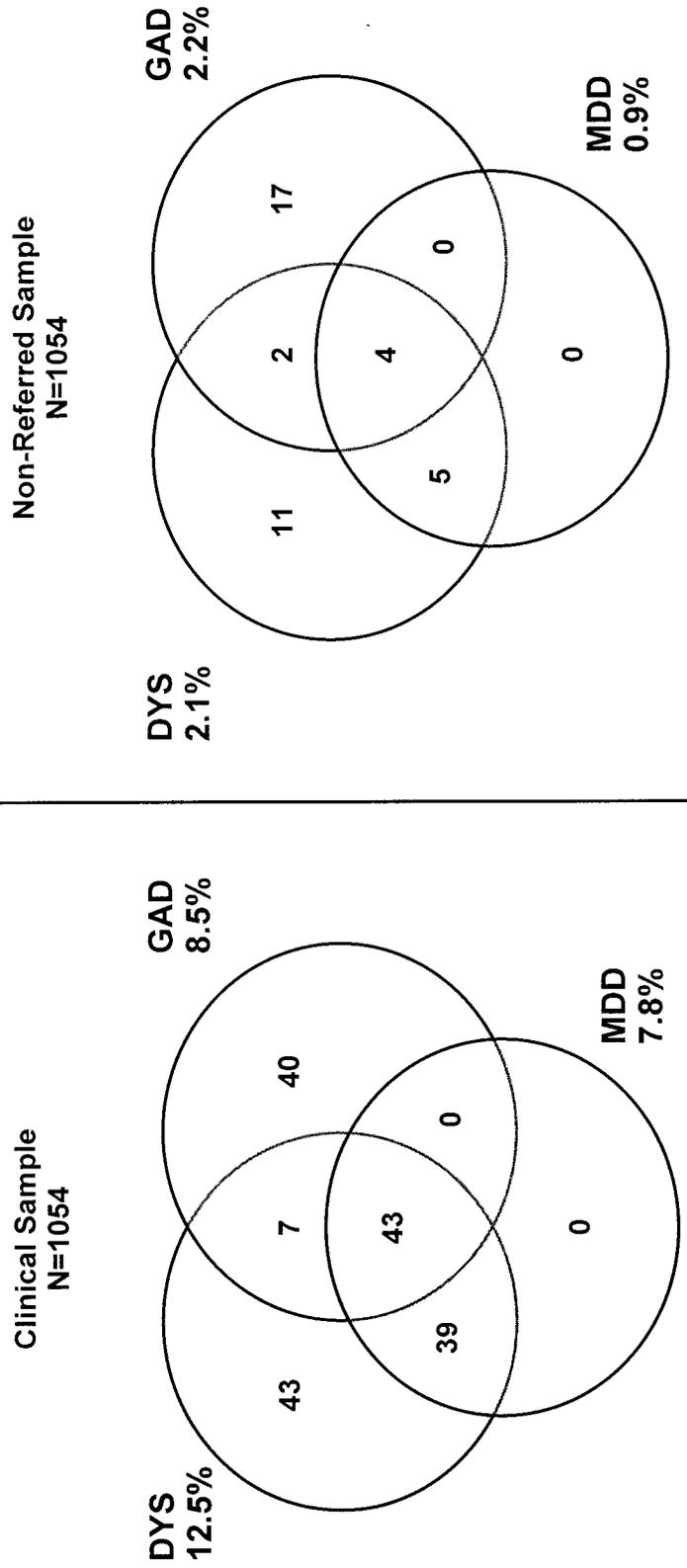
Fig. 1. Prevalence and overlap of youth report analogue diagnoses in clinical and nonreferred samples.

PARENT REPORT

Non-Referred Sample N=1075

GAD 0.1%

MDD 0.5%

DYS 2.0%

Clinical Sample N=1075

GAD 5.3%

MDD 8.0%

DYS 20.0%
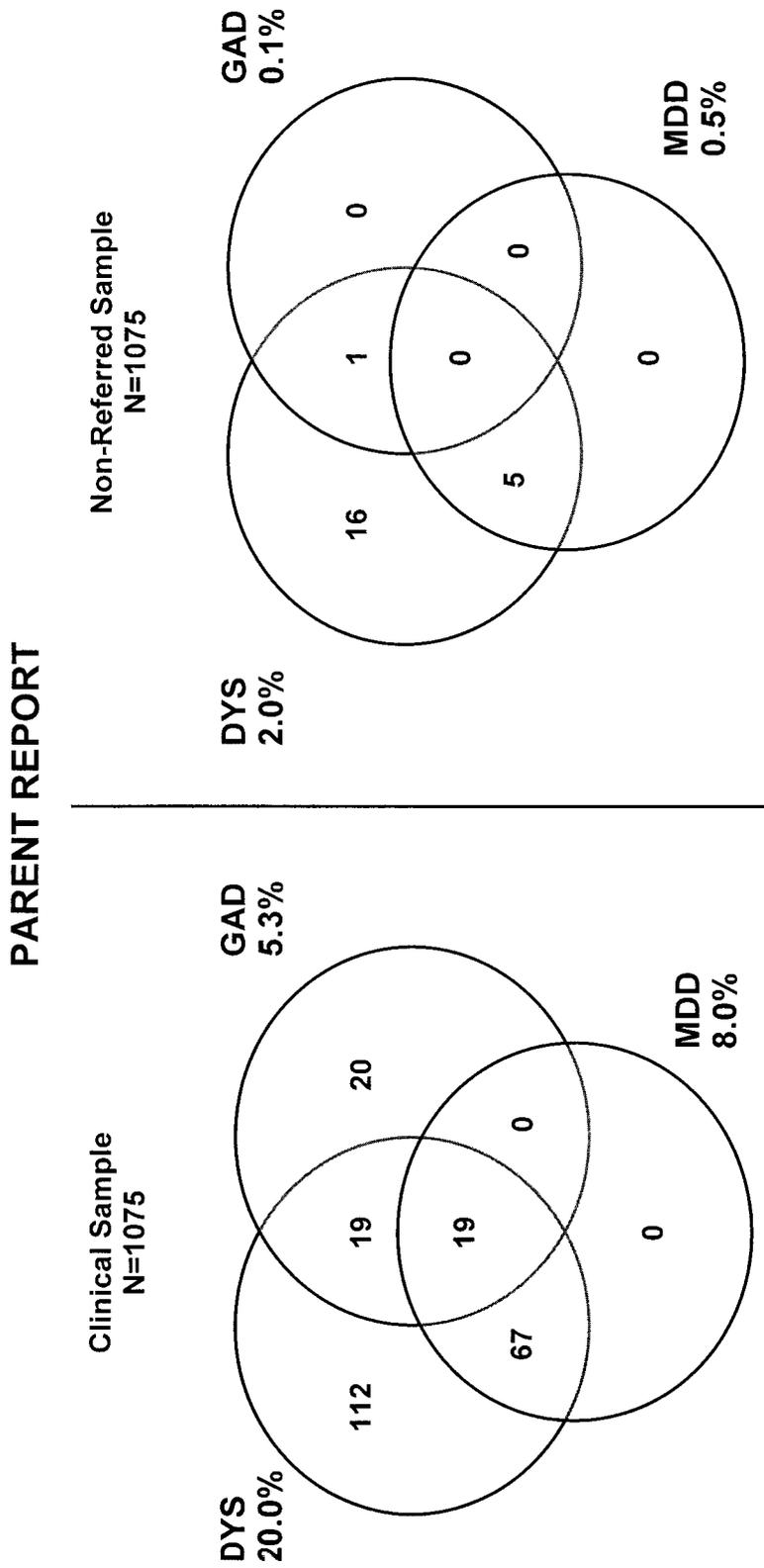
Fig. 2. Prevalence and overlap of parent report analogue diagnoses in clinical and nonreferred samples.

based on the presence or absence of an analogue diagnosis. According to youth reports, adolescents meeting criteria for the MDD analogue were 1.9 times more likely to have been referred for services than those who did not meet criteria, $\chi^2(1, N = 2108) = 61.2$, $p < .001$. The rates were similar for the DYS and GAD analogues at 1.8, $\chi^2(1, N = 2108) = 84.7$, $p < .001$, and 1.6, $\chi^2(1, N = 2108) = 42.0$, $p < .001$, respectively. For parent reports, adolescents meeting criteria for any analogue were 2.0 times more likely to have been referred, MDD $\chi^2(1, N = 2150) = 76.4$, $p < .001$, DYS $\chi^2(1, N = 2150) = 179.0$, $p < .001$, or GAD $\chi^2(1, N = 2150) = 57.7$, $p < .001$.

These analyses can also be reported from a different perspective to explore the odds of clinically referred adolescents having an analogue diagnosis. For youth report, referred adolescents were 9.1 times more likely to meet MDD, 6.0 times more likely to meet DYS, and 3.9 times more likely to meet GAD analogue criteria compared to nonreferred adolescents. Odds of having an analogue diagnosis were even higher based on parent report, with referred youth 17.4 times more likely to meet MDD, 9.9 times more likely to meet DYS, and 59.0 times more likely to meet GAD analogue criteria.

Relations Between Analogue Diagnosis and Competence

Because *DSM* disorders should be associated with significant impairment in important activities or relationships, the presence of an analogue diagnosis should predict disruption of social and academic competence. Odds ratios were used to assess relations between analogue diagnoses and CBCL and YSR social competence scales, with low competence defined as scoring below the borderline competence cutoff (33rd percentile). The number of participants in these analyses (1,737 self-reports and 1,932 parent reports) is less than the full sample because not all participants completed the social competence questions on the YSR and CBCL. Comparison of those completing or failing to complete the competence questions indicated no significant differences for age, sex, or ethnicity. However, referred youth were less likely to have completed the competence section.

According to youth reports, youth who met MDD analogue criteria were 3.7 times more likely to have low social competeence, $\chi^2(1, N = 1737) = 46.8$, $p < .001$, than those who did not meet MDD analogue criteria. Numbers were similar for the DYS and GAD analogues at 3.3, $\chi^2(1, N = 1737) = 49.0$, $p < .001$, and 2.8, $\chi^2(1, N = 1737) = 26.7$, $p < .001$, respectively. According to parent report, adolescents meeting criteria for MDD were 3.6 times more likely to have low social competence, $\chi^2(1, N = 1932) = 66.3$, $p < .001$, than youth not meeting MDD analogue criteria. Youth meeting DYS criteria were 4.2 times more likely to have low social competence, $\chi^2(1, N = 1932) = 171.7$, $p < .001$, and youth meeting GAD criteria were 2.5 times more likely to have low social competence, $\chi^2(1, N = 1932) = 61.2$, $p < .001$.

DISCUSSION

The goal of this study was to explore the utility of *DSM* analogues created with items from the commonly used CBCL and YSR. Across a range of childhood disorders, self-administered problem checklists have been shown to equal the reliability and validity of diagnostic interviews (Boyle et al., 1996; Gould, Bird, & Staghezza- Jaramillo, 1993; Jensen et al., 1996). Checklists may also be less vulnerable to socially desirable responding (Moum, 1998; Turner, Ku, Rogers, Lindberg, & Pleck, 1998), and to the nay-saying bias associated with interviews (Piacentini et al., 1999), as endorsing checklist items does not lengthen the assessment. In addition, paper-and-pencil measures have several practical advantages, as they can be completed in approximately 15 min and administered and scored by individuals with minimal training. Popular diagnostic interviews such as the Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), the Diagnostic Interview for Children and Adolescents (DICA; Reich, 2000), and the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS; Ambrosini, 2000) may take up to 2 hr to administer, and require substantial interviewer training, even for experienced clinicians.

Initial exploration of checklist-derived MDD, DYS, and GAD analogues produced encouraging results. Analogues yielded expected age and sex effects according to self-reports, and the bidirectional comorbidity of mood and anxiety analogues fell within expected ranges for youth and parent reports. Rates of MDD were lower than rates of DYS for both referred and nonreferred adolescents, and the MDD analogue was associated with greater comorbidity than the DYS analogue, suggesting the analogues represent two levels of severity. However, the fact that all individuals meeting criteria for the MDD analogue also met criteria for the DYS analogue, suggests that the inability to assess symptom duration with the CBCL and YSR leads to low discriminant validity. The analogue diagnoses also met the stipulation that diagnosis be associated with functional impairment. All three analogue diagnoses were associated with low competence ratings and

showed a strong ability to discriminate between clinically referred and nonreferred youth.

Although it is possible to use checklists that closely parallel diagnostic interviews, there are advantages to generating diagnostic analogues based on items from the commonly used CBCL and YSR. The first is the ability to compare *DSM-IV* symptoms easily to the empirically derived syndromes without administering multiple measures. This may be an important step toward bridging the gap between research using diagnostic interview measures of *DSM* disorders and studies measuring symptoms using the CBCL, YSR, or CDI. The second advantage is that symptoms of each disorder are distributed throughout the CBCL and YSR, rather than clustered together, reducing the possibility of a response set. Of course, using items only from the CBCL and YSR also results in a less than perfect match of analogue symptoms to *DSM* criteria because the CBCL and YSR do not assess difficulty controlling worry, and symptom duration is not assessed according to *DSM* criteria. New versions of the CBCL and YSR will provide a closer match to *DSM* symptoms of depression, as an item assessing anhedonia has been added (Achenbach & Rescorla, 2001). New versions of the CBCL and YSR have not made any other alterations to items assessing symptoms of depression or anxiety, and so findings for analogue scales based on 1991 versions remain relevant.

Analogue scales generated in this study differ somewhat from other CBCL and YSR analogue measures of *DSM* disorders, including the *DSM*-oriented scales for Affective Problems and Anxiety Problems (Achenbach & Rescorla, 2001) and the Anxiety and Depression scales (Lengua et al., 2001). In comparison to the Affective Problems scale (Achenbach & Rescorla, 2001) and Depression scale (Lengua et al., 2001), the MDD analogue from this project excluded items that are related to depression but do not directly match *DSM* symptoms (e.g., lonely, cries, feels unloved), and included items assessing *DSM* MDD symptoms of irritability, psychomotor agitation, concentration problems, and overeating that are not included in other recent analogue scales. In comparison to the Anxiety Problems scale (Achenbach & Rescorla, 2001) and the Anxiety scale (Lengua et al., 2001), which were not designed to be specific to GAD, the GAD analogue excluded items assessing dependent behavior and nervous movements, and included items assessing restlessness, fatigue, difficulty concentrating, irritability, and sleep problems. Of analogue measures based solely on checklist items, the scales tested in this study provide the strongest match to *DSM* criteria, because they exclude extraneous items, more fully assess symptoms of major depression and GAD, and avoid inflating the impact of related items by combining them to assess a single symptom, rather than allowing each related

item to contribute independently to a total score. Findings for the analogue scales tested in this study also compare favorably to the Ontario Child Health Study analogues, which were an excellent match for *DSM* criteria, but were based on the addition of items to assess anhedonia and difficulty with decision making (Boyle et al., 1993; Fleming et al., 1989). The MDD analogue tested in this study did a comparable job of highlighting age and sex differences in rates of depression, and of demonstrating a link to mental health services referral and poor social competence, despite the absence of additional items.

A potential limitation of the analogue measures is the low internal consistencies of the scales. Internal consistencies for the MDD, DYS, and GAD analogue scales were comparable to similar analogue scales (Bowen et al., 1990), but lower than internal consistencies for the DISC-R (Schwab-Stone et al., 1993) and for the CBCL/YSR Anxious/Depressed syndrome. However, it is not surprising that analogue measure consisting of 5–8 low-prevalence, dichotomously scored items had lower internal consistencies than the 14-item Anxious/Depressed syndrome, which used a 3-point rating for items and was derived based on strong interitem correlations. The excellent internal consistencies and test-retest reliabilities of the empirically derived syndromes on the CBCL and YSR do suggest that the individual items used to create the analogue measures are of high quality. Alphas for analogues may also have been low because each item assessed a separate symptom, such as sadness, appetite disruption, sleep disruption, psychomotor agitation, fatigue, guilt, poor concentration, and suicidality. Although these symptoms of MDD cluster together for highly distressed individuals, they do not necessarily cluster together across diverse samples of adolescents. Differences between analogue and interview reliabilities may also occur because analogue symptoms were randomly dispersed throughout a set of over 100 items, rather than clustered together by disorder, as is the case with diagnostic interviews.

Rates of analogue diagnoses in the nonreferred sample appeared to be slightly lower than interview-based prevalence rates found in epidemiological studies. In community samples, point prevalence rates for MDD and DYS range from 1 to 4% (Angold & Rutter, 1992; Breton et al., 1999; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Verhulst et al., 1997), and estimates of GAD range from less than 0.7% (Verhulst et al., 1997) to nearly 4% (Whitaker et al., 1990). Rates may have been lower because the nonreferred sample specifically excluded any youth who had received treatment, whereas community samples in epidemiological studies included these youth. Clearly, an essential next step in determining the value of analogue measures will be direct comparison of checklist

analogues with diagnoses based on structured clinical interviews. To be useful as screening tools, analogue measures will need to predict diagnoses more accurately than CBCL and YSR syndromes. One potential limitation in this next step will be the test-retest reliability of interview diagnoses. Researchers using structured diagnostic interviews have found kappas as low as .50 for MDD and .30 for DYS (Schwab-Stone et al., 1996), which sets an upper bound for the kappas between an interview-based diagnosis and checklist-based analogue.

Findings from this exploration of analogue diagnoses also have implications for understanding differences in symptoms reported by parents and youth. Although it is commonly believed that adults represent superior informants for externalizing disorders, while youth represent better informants for mood and anxiety disorders, the available data are not so clear. Several studies have suggested that youth do report more symptoms of mood and anxiety problems (Fleming & Offord, 1990; Kazdin, 1994), but others have found the opposite pattern (Fisher et al., 1993; King et al., 1997). Numerous studies have also suggested that parent-report data more closely parallel diagnoses made by clinicians based on observations, interviews, or chart reviews, and have superior test-retest reliability (Fisher et al., 1993; King et al., 1997; Schwab-Stone et al., 1996). Data from the current study revealed a more pronounced difference between youth- and parent-report rates for the GAD analogue than for the MDD or DYS analogues, with parents reporting fewer anxiety symptoms. It is possible that some symptoms of MDD and DYS, such as appetite disturbance, may be more observable to outside raters than are symptoms of anxiety. Although youth may be better reporters of unobservable emotions, parents play an important role in determining referral for treatment, making parent reports equally important to understand (McGee et al, 1990). Given that parents are responsible for initiating treatment, it is not surprising that odds of referred youth meeting criteria for an analogue were higher according to parent reports than youth reports.

Despite limitations, the potential time and cost-saving benefits of using checklist measures to screen for *DSM* diagnoses suggest that further investigation of analogue scales is warranted. Additional research will be important in determining how different methods of combining youth and parent reports influence diagnostic sensitivity and specificity. The cut-points for acceptable sensitivity and specificity will depend on the intended use of the analogue, as clinicians or school personnel using a checklist-based analogue as a screening tool may wish to sacrifice sensitivity to be sure all youth likely to have disorders receive additional assessment. Researchers may prefer a stricter approach, paying more attention to specificity

to avoid including participants who fail to meet criteria for a disorder. Because the goal of this study was to generate the closest possible match to *DSM* disorders, participants were categorized as either meeting or failing to meet criteria for analogue scales, just as individuals either meet or do not meet criteria for *DSM* disorders. However, continuous scores increase variability and statistical power, advantages that have been recognized in other checklist-based measures of *DSM* symptoms (e.g., Achenbach & Rescorla, 2001; Clarke et al., 1992; Lengua et al., 2001). In seeking the balance between sensitivity and specificity, the benefits of continuous scores should be explored both for analogue scales and for *DSM* symptoms endorsed on diagnostic interviews.

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REFERENCES

Achenbach, T. M. (1991a). *Manual for the Child Behavior Checklist/4–18 and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M. (1991b). *Manual for the Youth Self-Report and 1991 profile*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M. (1991c). *Integrative guide for the 1991 CBCL/4–18, YSR, and TRF profiles*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Rescorla, L. A. (2001). *The Manual for the ASEBA School-Age Forms & Profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.

Ambrosini, P. J. (2000). Historical development and present status of the Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS). *Journal of the American Academy of Child and Adolescent Psychiatry, 39,* 49–58.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Angold, A., & Rutter, M. (1992). Effects of age and pubertal status on depression in a large clinical sample. *Development and Psychopathology, 4,* 5–28.

Berube, R. L., & Achenbach, T. M. (2001). *Bibliography of published studies using ASEBA instruments: 2001 edition*. Burlington, VT, University of Vermont, Research Center for Children, Youth, and Families.

Biederman, J., Faraone, S., Mick, E., Moore, P., & Lelon, L. (1996). Child Behavior Checklist findings further support comorbidity between ADHD and major depression in a referred sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 734–742.

Bird, H. R., Gould, M. S., & Staghezza, B. M. (1993). Patterns of diagnostic comorbidity in a community sample of children aged 9 through 16 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 32,* 361–368.

Bowen, R. C., Offord, D. R., & Boyle, M. H. (1990). The prevalence of overanxious disorder and separation anxiety disorder: Results from the Ontario Child Health Study. *Journal of the American Academy of Child and Adolescent Psychiatry, 29,* 753–758.

Boyle, M. H., Offord, D. R., Racine, Y. A., Fleming, J., Szatmari, P., & Sanford, M. (1993). Evaluation of the Revised Ontario Child Health Study Scales. *Journal of Child Psychology and Psychiatry*, *34*, 189–213.

Boyle, M. H., Offord, D. R., Racine, Y. A., Szatmari, P., Sanford, M., & Fleming, J. (1996). Interviews versus checklists: Adequacy for classifying childhood psychiatric disorder based on adolescent reports. *International Journal of Methods in Psychiatric Research*, *6*, 309–319.

Breton, J., Bergeron, L., Valla, J., Berthiaume, C., Gaudet, N., Lambert, J., et al. (1999). Quebec Child Mental Health Survey: Prevalence of DSM-III-R Mental Health Disorders. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *40*, 375–384.

Chen, W. J., Faraone, S., Biederman, J., & Tsuang, M. T. (1994). Diagnostic accuracy of the Children Behavior Checklist scales for attention-deficit hyperactivity disorder: A receiver-operating characteristic analysis. *Journal of Consulting and Clinical Psychology*, *62*, 1017–1025.

Clarke, G. N., Lewinsohn, P. M., Hops, H., & Seeley, J. R. (1992). Parent and self-report measures of adolescent depression: The Child Behavior Checklist depression scale. *Behavioral Assessment*, *14*, 443–463.

Compas, B. E., Ey, S., & Grant, K. E. (1993). Taxonomy, assessment, and diagnosis of depression during adolescence. *Psychological Bulletin*, *114*, 323–344.

Compas, B. E., & Oppedisano, G. (2000). Mixed anxiety/depression in childhood and adolescence. In A. J. Sameroff & M. Lewis (Eds.), *Handbook of developmental psychopathology* (2nd ed., pp. 531–548). New York: Kluwer Academic/Plenum.

Eiraldi, R. B., Power, T. J., Karustis, J. L., & Goldstein, S. G. (2000). Assessing ADHD and comorbid disorders in children: The Child Behavior Checklist and the Devereux Scales of Mental Disorders. *Journal of Clinical Child Psychology*, *29*, 3–16.

Fisher, P. W., Shaffer, D., Piacentini, J. C., Lapkin, J., Kafantaris, V., Leonard, H., et al. (1993). Sensitivity of the Diagnostic Interview Schedule for Children, 2nd edition (DISC-2.1) for specific diagnoses of children and adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *32*, 666–673.

Fleming, J. E., & Offord, D. R. (1990). Epidemiology of childhood depressive disorders: A critical review. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*, 571–580.

Fleming, J. E., Offord, D. R., & Boyle, (1989). Prevalence of childhood and adolescent depression in the Ontario Community Child Health Study. *British Journal of Psychiatry*, *155*, 647–654.

Gerhardt, C. A., Compas, B. E., Connor, J. K., & Achenbach, T. M. (1999). Association of mixed anxiety/depression syndrome and symptoms of major depressive disorder in adolescents. *Journal of Youth and Adolescence*, *28*, 305–323.

Gould, M. S., Bird, H., & Staghezza-Jaramillo, B. (1993). Correspondence between statistically derived behavior problem syndromes and child psychiatric diagnoses in a community sample. *Journal of Abnormal Child Psychology*, *21*, 287–313.

Hollingshead, A. B. (1975). *Four factor index of social status*. New Haven, CT: Yale University, Department of Sociology.

Jensen, P. S., Watanabe, H. K., Richters, J. E., Roper, M., Hibbs, E. D., Saltzberg, A. D., et al. (1996). Scales, diagnoses, and child psychopathology: II. Comparing the CBCL and DISC against external validators. *Journal of Abnormal Child Psychology*, *24*, 151–168.

Kashani, J., & Orvaschel, H. (1990). A community study of anxiety in children and adolescents. *American Journal of Psychiatry*, *147*, 313–318.

Kazdin, A. E. (1994). Informant variability in the assessment of childhood depression. In W. M. Reynolds and H. F. Johnston (Eds.), *Handbook of depression in children and adolescents*. New York: Plenum Press.

King, C. A., Katz, S. H., Ghaziuddin, N., Brand, E., Hill, E., & McGovern, L. (1997). Diagnosis and assessment of depression and suicidality using the NIMH Diagnostic Interview Schedule for Children (DISC-2.3). *Journal of Abnormal Child Psychology*, *25*, 173–181.

Kovacs, M., Gatsonis, C., Paulauskas, S. L., & Richards, C. (1989). Depressive disorders in childhood: IV. A longitudinal study of comorbidity with and risk for anxiety disorders. *Archives of General Psychiatry*, *46*, 776–782.

Last, C. G., Strauss, C. C., & Francis, G. (1987). Comorbidity among childhood anxiety disorders. *Journal of Nervous and Mental Diseases*, *175*, 726–730.

Lengua, L. J., Sadowski, C. A., Friedrich, W. N., & Fisher, J. (2001). Rationally and empirically derived dimensions of children's symptomatology: Expert ratings and confirmatory factor analyses of the CBCL. *Journal of Consulting and Clinical Psychology*, *69*, 683–698.

Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., & Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology*, *107*, 109–117.

Lewinsohn, P. M., Hops, H., Roberts, R. E., Seeley, J. R., & Andrews, J. A. (1993). Adolescent psychopathology: I. Prevalence and incidence of depression and other DSM-IV-III-R disorders in high school students. *Journal of Abnormal Psychology*, *102*, 133–144.

McGee, R., Feehan, M., Williams, S., Partridge, F., Silva, P., & Kelly, J. (1990). DSM-IV-III disorders in a large sample of adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, *29*, 611–619.

Moum, T. (1998). Mode of administration and interviewer effects in self-reported symptoms of anxiety and depression. *Social Indicators Research*, *45*, 279–318.

Nolen-Hoeksema, S. & Girgus, J. S. (1994). The emergence of gender differences in depression during adolescence. *Psychological Bulletin*, *115*, 424–443.

Nottelmann, E. D., & Jensen, P. S. (1995). Comorbidity of disorders in children and adolescents: Developmental perspectives. *Advances in Clinical Child Psychology*, *17*, 109–155.

Nurcombe, B., Seifer, R., Scioli, A., Tramontana, M. G., Grapentine, W. L., & Beauchesne, H. C. (1989). Is major depressive disorder in adolescence a distinct entity? *Journal of the American Academy of Child and Adolescent Psychiatry*, *28*, 333–342.

Petersen, A. C., Sarigiani, P. A., & Kennedy, R. E. (1991). Adolescent depression: Why more girls? *Journal of Youth and Adolescence*, *20*, 247–271.

Piacentini, J., Roper, M., Jensen, P., Lucas, C., Fisher, P., Bird, H., et al. (1999). Informant-based determinants of symptom attenuation in structured child psychiatric interviews. *Journal of Abnormal Child Psychology*, *27*, 417–428.

Reich, W. (2000). Diagnostic Interview for Children and Adolescents (DICA). *Journal of the American Academy of Child and Adolescent Psychiatry*, *39*, 59–66.

Rey, J. M., & Morris-Yates, A. (1992). Adolescent depression and the child behavior checklist. *Journal of the American Academy of Child and Adolescent Psychiatry*, *30*, 423–427.

Roberts, R. E., Lewinsohn, P. M., & Seeley, J. R. (1995). Symptoms of DSM-III-R major depression in adolescence: Evidence from an epidemiological survey. *Journal of the American Academy of Child and Adolescent Psychiatry*, *34*, 1608–1617.

Schwab-Stone, M., Fisher, P., Piacentini, J., Shaffer, D., Davies, M., & Briggs, M. (1993). The Diagnostic Interview Schedule for Children—Revised Version (DISC-R): II. Test-retest reliability. *Journal of the American Academy of Child and Adolescent Psychiatry*, *32*, 651–657.

Schwab-Stone, M. E., Shaffer, D., Dulcan, M. K., Jensen, P. S., Fisher, P., Bird, H. R., et al. (1996). Criterion validity of the NIMH Diagnostic Interview Schedule for Children Version 2.3 (DISC-2.3). *Journal of the American Academy of Child and Adolescent Psychiatry*, *35*, 878–888.

Seifer, R., Nurcombe, B., Scioli, A., & Grapentine, W. L. (1989). Is major depressive disorder in childhood a distinct diagnostic entity? *Journal of the American Academy of Child and Adolescent Psychiatry*, *28*, 935–941.

Shaffer, D., Fisher, P., Lucas, C. P., Dulcan, M. K., & Schwab-Stone, M. E. (2000). NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC- IV): Description, differences from previous versions, and reliability of some common diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry*, *39,* 28–38.

Strauss, C. C., Last, C. G., Hersen, M., & Kazdin, A. E. (1988). Associations between anxiety and depression in children and adolescents with anxiety disorders. *Journal of Abnormal Child Psychology*, *16,* 57–68.

Turner, C. F., Ku, L., Rogers, S. M., Lindberg, L. D., & Pleck, J. H. (1998). Adolescent sexual behavior, drug use, and violence: Increased reporting with computer survey technology. *Science*, *280,* 867–873.

Verhulst, F. C., van der Ende, J., Ferdinand, R. F., Kasius, M. C. (1997). The prevalence of DSM-III-R diagnoses in a national sample of Dutch adolescents. *Archives of General Psychiatry*, *54,* 329–336.

Whitaker, A., Johnson, J., Shaffer, D., Rapoport, J. L., Kalikow, K., Walsh, B. T., et al. (1990). Uncommon troubles in young people: Prevalence estimates of selected psychiatric disorders in a nonreferred adolescent population. *Archives of General Psychiatry*, *47,* 487–496.