Published in final edited form as:
Clin Psychol Rev. 2009 February ; 29(1): 77–86. doi:10.1016/j.cpr.2008.10.001.

Attention deficit hyperactivity disorder in African American children: What can be concluded from the past ten years?☂

Torri W. Miller[a,*], **Joel T. Nigg**[b], and **Robin L. Miller**[c]

[a] Michigan State University, Psychology Building, East Lansing, MI 48824, USA

[b] Michigan State University, 115C Psychology Building, East Lansing, MI 48824, USA

[c] Michigan State University, 134A Psychology Building, East Lansing, MI 48824, USA

Abstract

Samuel et al. [Samuel, V. J., Curtis, S., Thornell, A., George, P., Taylor, A., Brome, D. R., et al. (1997). The unexplored void of ADHD and African-American research: A review of the literature. Journal of Attention Disorders, 1(4), 197–207.] reviewed the literature on Attention Deficit Hyperactivity Disorder (ADHD) in African Americans, and found a paucity of research. The present review of 73 articles updates this assessment of available research and presents the current understanding of ADHD symptoms, assessment, diagnosis, and treatment in African American children ages 3–18. The authors conducted a qualitative review, as well as a mini meta-analysis of 5 studies of ADHD symptoms and 5 studies of ADHD diagnosis to clarify the question of racial differences in prevalence. African American youth had more ADHD symptoms (Cohen's $d = 0.45$, $p<.001$), yet were diagnosed with ADHD only two-thirds as often as Caucasian youth (OR = .66, $p<.001$). This pattern was not explained by teacher rating bias or by SES, but may be influenced by parent beliefs about ADHD, higher rates of risk, and lack of treatment access and utilization. Lower treatment rates may be related to high rates of classroom behavior problems among African American youth. Findings also suggest that existing assessment tools may not adequately capture ADHD manifestation in African Americans. Findings highlight the need for more investigation and awareness of relevant cultural issues to inform a culturally competent approach to assessment, diagnosis, and treatment of ADHD in African Americans.

Keywords

ADHD; African American; Prevalence; Inattention; Hyperactivity

Attention-deficit/hyperactivity disorder (ADHD) is defined by persistent, pervasive, impairing, and developmentally excessive levels of hyperactivity/impulsivity, and inattention (APA, 2000). It is one of the most common clinical and educational referral problems in the United States (Gordon et al., 2006). It is believed to occur in 3–7% of

*Author Note: The current study was supported by R01-2MH59105. The authors thank Fred Oswald, Ph.D., for consultation on statistical methods.

* Corresponding author. torri@msu.edu (T.W. Miller)..

school-aged children (APA, 2000) with a recent meta-regression analysis of all studies worldwide suggesting a global prevalence of about 5% (Polanczyk et al., 2007). The clinical prople includes two psychometrically distinct but highly correlated symptom domains: inattention-disorganization, and hyperactivity-impulsivity. These two domains are used to create three subtypes in the DSM-IV: predominantly hyperactive-impulsive type; predominantly inattentive type; and combined type. The etiological and taxonomic relations among these types are unclear, and data on ADHD and race usually fail to isolate the types described in DSM-IV. This review therefore pertains to all subtypes, although we note the few occasions when subtype data exist.

ADHD frequently co-occurs with disruptive behavior problems such as defiance, aggression, anger, tantrums, and antisocial behaviors. Those disruptive behaviors are classified in the DSM-IV as either oppositional defiant or conduct disorder. Conceptually, we follow the convention of treating ADHD as distinct from disruptive behavior problems (Achenbach, 1991a). However, procedurally, we note that potential rater halo effects render disruptive behaviors an unavoidable topic of discussion later.

ADHD has been researched extensively and much is known about its etiology, assessment, treatment, and associated pathology (Barkley, 2006). Yet as recently as a decade ago, it could be easily asserted that there was a paucity of research pertaining to race (Samuel et al., 1997). What is the status of the field today? Historically, studies of ADHD examined Caucasian males (Barkley, Fischer, Smallish, & Fletcher, 2004; Loney, Kramer, & Milich, 1981; Mannuzza, Klein, Bessler, Malloy, & LaPadula, 1993). Although, as this review will note, such paucity has been partially rectified in the past decade, it remains a common characteristic in the literature. Although many different ethnic groups warrant investigation, the literature is too sparse to enable examination of most. This review focuses particularly on African Americans.

This focus is justified by several considerations. First, as reviewed by Kendall and Hatton (2002), African Americans have the highest poverty rate among all racial and ethnic groups in the United States. Low socio-economic status (SES) is associated with less access to health care and increased psychological and physiological stress and health problems generally (Kendall & Hatton, 2002). Yet, as those authors document, low SES alone does not account for differences in health outcomes among African Americans versus other groups. Over and above SES, other factors may create different experiences in school and other public environments for African American than Caucasian children. Such race-related effects may include overt and covert discrimination as well as fundamental societal inequalities that may place African American children at a disadvantage compared to their Caucasian peers. Indeed, racial health disparities exist between African Americans and Caucasians even when SES is controlled, including higher all-cause rates of morbidity and mortality, and a higher incidence of HIV/AIDS and many forms of cancer (CDC, 2006, 2007; Kendall & Hatton, 2002). Thus, African Americans are a group with unique health risks.

Second, different racial groups may have varying behavioral expectancies and tolerances for (a) acceptable child or adolescent behavior, as well as about (b) mental health care

(Livingston, 1999). Understanding any such variation is crucial to understanding developmental psychopathology. The potential importance of these culture-specific effects as moderators of developmental processes has begun to be documented in regard to child externalizing behavior (e.g., Deater-Deckard, Dodge, Bates, & Pettit, 1996) but has yet to be well studied for attention problems or ADHD.

Third, rater biases on the part of interviewers or researchers may obscure or create differences in patterns, correlates, or levels of behavioral expression. Mann et al. (1992) examined this phenomenon, though not in African Americans. Mental health professionals from four countries (China, Indonesia, Japan, and Hawaii in the United States) rated taped vignettes of hyperactive-disruptive behaviors in 8-year-old actors (from Honolulu and Tokyo). Psychologists from China and Indonesia rated the children as more hyperactive-disruptive than psychologists from Japan and Hawaii. This suggests cultural differences in rating levels of hyperactivity and disruptive behavior even when the behavior is held constant.

Fourth, this review comes in the context of a well known history of differential misdiagnosis of African Americans in psychiatric assessment in adults (Friedman, Paradis, & Hatch, 1994; Whaley & Geller, 2007). That literature has been understood as indicating that clinicians, using non-standard assessment practices, tend to judge the same clinical presentation differently by race, obscuring any objective differences in rates of disorder. Whether such effects may also hold for child disorders is essentially unknown. However, it was notable that the National Comorbidity Survey (Kessler et al., 1994) found no differences in rates of major Axis I disorders in African Americans and Caucasians when diagnoses were based on standard structured interviews in a community setting, instead of unstructured clinician assessment in a clinical setting. Thus, reference to standardized assessments may be important in understanding any apparent bias in diagnostic assignments in children as well.

Fifth, in the area of treatment outcomes for mental disorders, Weisz, Huey, and Weersing (1998) acknowledged a lack of research in ethnic minorities a decade ago, concluding that much of the literature was based on case examples rather than empirical findings. The limited empirical studies involved poorly matched samples and lacked within-study analyses of moderating effects of ethnicity on ADHD treatment outcome. It therefore remained unclear at that time whether there were differences in treatment outcomes across ethnic groups.

As a result of these issues, a decade ago it was not even clear whether ADHD symptom levels differed between African Americans and Caucasian Americans, or whether African Americans were diagnosed with ADHD more often than Caucasian Americans.

In sum, consideration of race is important to fully understand in etiology and development as well as in clinical assessment, diagnosis, and treatment for children with ADHD. Samuel et al. (1997) conducted a systematic literature review, but were able to identify only 16 articles relevant to ADHD in African American youth — and few of those featured race as the primary focus of research. Of these studies, those that examined ADHD among African

Americans in a school context showed that race might affect how teachers rate hyperactivity (Calhoun, 1975; Lambert et al., 1978; Langsdorf et al., 1979; Stevens, 1981). Studies evaluating ADHD assessment tools were so sparse that they were largely inconclusive.

The present review, 10 years after Samuel et al. (1997), aims to capture more recent data on the subject. Several key questions drive the current review: Is ADHD associated with different diagnostic prevalence, behavioral symptom severity, or other risk factors in African American children than Caucasian American children? Are appropriate tools available to assess the diagnostic characteristics of ADHD in African American children? What factors influence treatment access, compliance, and efficacy in African Americans?

1. Method

We conducted a systematic computer search of PsychInfo, PsychArticles, and MedLine databases. The literature review included all peer-reviewed journal articles written in the English language and published from 1990 to 2007. Only studies with participants from the USA were examined, excluding dissertations. Search terms included: “ADHD,” “ADD,” “Attention Deficit Hyperactivity Disorder,” “Attention Deficit Disorder,” and “hyperactivity” which were cross-listed with “Black,” “African American,” “Negro,” or “Afro-.” Of the 462 articles resulting from this search, ADHD in African American children was the major topic of investigation — defined as including specific analyses of African Americans separately from other groups — in 53 articles. In this review, the term African American refers to American individuals of African descent, and does not necessarily include Caribbean Blacks, Hispanic Blacks, or Africans. We scanned the reference lists from the identified literature and found an additional 20 relevant articles that our database searches missed. 57 of the total 73 articles were grouped informally into the following categories based on common themes (with some overlap): syndromal characteristics (N = 34 articles), treatment (N = 17 articles), and parent perceptions of ADHD (N =6 articles). 52 of these articles were empirical investigations and the rest were reviews or opinion pieces. Five studies provided systematic data on cross-race comparison of ratings of ADHD symptoms, and five others on incidence of ADHD diagnosis by race. The age range of the children studied was 3–18 years.

Much of the present review is, of necessity, a qualitative literature review. However, to address the question of average symptom levels and diagnostic frequency, a quantitative mini meta-analysis was conducted of the five studies related to each question. This was done using the effect size calculator “MIX,” which pooled and weighted the sample sizes (Bax, Yu, Ikeda, Tsuruta & Moons, 2006; Bax, Yu, Ikeda & Moons, 2007). Confidence intervals around the effect sizes were calculated using standard formulas, for mean scores via the applet www.stat.tamu.edu/~jhardin/applets/signed/case11.html and for proportions using the applet, www.caucascientia.org/math_stat/proportionCI.html. For studies that dealt with prevalence rates, we calculated the Odds Ratio (OR) using Bland and Altman's (2000) formula. We used the log OR to normalize the confidence intervals and avoid the skew using a standard log OR calculator (www.changbioscience.com/stat/logr.html). We also used the Bland and Altman (2000) formula provided to calculate the standard error of the log OR. Once these supplementary calculations were complete, the meta-analyses were

computed using the MIX program. Both meta-analytic tables used fixed effect models with an inverse variance weighting method. Table 2 used a comparative analysis with OR as the association measure.

2. Results

We discuss in sequence results of symptom ratings and prevalence estimates, factors that affect presentation of ADHD, and empirical bases for assessment and treatment of ADHD in African American youth. We note where relevant how findings on African Americans compare to those established in the main body of ADHD research (predominantly Caucasian samples). We include the quantitative as well as qualitative review in this "results" section.

2.1. I. ADHD syndromal characteristics and correlates in African Americans

2.1.1. A. Symptom levels and ADHD prevalence in African American and Caucasian children—

Tables 1 and 2 present quantitative results for behavior ratings and prevalence rates respectively, of ADHD in African American children compared to rates in Caucasian children, pooled across studies. Despite some inconsistencies across studies, the weighted aggregate effects across studies were clear and substantial. ADHD behavior ratings yielded higher scores for African American children than Caucasians; in Table 1 the pooled effect is shown by a Cohen's D value of 0.45 ($p<.001$), which is a medium effect size. In contrast, studies of ADHD diagnosis yielded lower prevalence for African American youth. Overall, Caucasians were 1.5 times more likely to have ADHD than African Americans (OR = .66, $p<.001$) or put another way, African American youth were diagnosed with ADHD only 2/3 as often as Caucasian youth. These two findings thus are apparently contradictory.

The higher problem rating for African American youth held up in both parent and teacher ratings (Table 1). Whereas four of the five studies did rely on teacher report, this finding was not explained by teacher rating bias. One study attempted to check potential bias in teacher ratings using classroom observations (Epstein et al., 2005). They examined participants of the MTA[1] study (all diagnosed with DSM-IV ADHD-C). African Americans were rated more highly than Caucasians on the Conners' Teacher Rating Scale and SNAP but not the CBCL Teacher Report Form. Yet these differences appeared to be veridical: the African American youth were also rated as having more problem behaviors by classroom observations. Correlations between a latent variable for teacher ratings and for observed behaviors were similar for African Americans ($\varphi = .35$) and Caucasians ($\varphi = .25$). In an additional study, when the average child's behavior in each classroom was considered, differences between African American and Caucasian children decreased over 50%, and were no longer significant. Thus, African American youth were more likely to be in classrooms with more disruptive behavior. The correlation between teacher-rated and

[1]The Multimodal Treatment Study of Children with ADHD (MTA) was the largest randomized controlled study of ADHD treatment in the United States to date. Participants were randomly assigned to one of four treatment conditions for a 14-month period. These included (1) a multifaceted behavior therapy program that incorporated parent training, school intervention, and child treatment (Beh); (2) a medication management program involving drug titration (MedMgt); (3) a combination of the behavior therapy and medication management treatments (Comb); and (4) a comparison group that was assessed by the MTA and referred out to seek their choice of routine community treatment (CC).

classroom-observed behavior appeared numerically greater for African Americans ($\varphi = .34$) versus Caucasians ($\varphi = .15$).

Two interpretations of these findings are possible. First, the classroom environment of African American children may be more active and less structured, resulting in higher observed and teacher rated levels of ADHD behavior. Alternatively, African American children exhibit higher levels of impairing ADHD behavior than Caucasian children. The authors did not have sufficient data to test these alternatives (e.g., children were not in segregated classrooms). In addition, teacher and observer ethnicity were not factored into the analyses, and SES effects were confounded with ethnicity, leaving alternative explanations in doubt. More such studies that could disentangle child and classroom level effects using observational methods would clearly be informative.

In contrast to findings based on behavior rating scale data, when we consider a clinical diagnosis of ADHD rendered by a health professional according to ICD or DSM criteria, African Americans had ADHD less frequently than Caucasians. Table 2 shows a medium effect pooled across studies. Three of the five studies found more ADHD in Caucasian Americans than in African Americans (dosReis et al., 2001; Pastor & Reuben, 2005; Stevens et al., 2005). The other two studies showed that prevalence rates were equal across these two racial groups (Angold et al., 2002; Rowland et al., 2002); both of the latter two relied on data collected from North Carolina public schools. There was insufficient power to test regional moderation of prevalence formally.

The conjunction of the apparently contrasting findings in Table 1 and Table 2 may at first seem puzzling. However, both tables would be explained by decreased access to and use of services by African Americans (Angold et al., 2002; Bussing, Zima, Gary, & Garvan, 2003), resulting in lower rates of identification, less treatment, and more classroom behavior problems in African American youth. This is certainly possible for four of the five studies in Table 2, which relied on medical record or parent report that a medical diagnosis had been given. It is less clear that it can explain the results of Angold et al. (2002), because participants were randomly surveyed from school databases, and DSM-IV diagnoses were generated based on parent and child reports on a structured clinical interview.

Neither the behavioral nor the diagnostic findings appear to be due to potentially confounding variables such as birth weight, income, and insurance coverage. Pastor and Reuben (2005) controlled for these variables as well as comorbid learning disability, yet found that neither of these factors accounted for the noted race differenced in ADHD diagnosis. Similar results were found by dosReis, Zito, Safer, and Soeken (2001) in a population-based study of ADHD in children with Medicaid insurance in a suburban mid-Atlantic community.

2.1.2. B. Is ADHD a more severe disorder in African Americans?—Severity refers to the severity of comorbidity, intensity of behaviors, and other impairments associated with a disorder. That is, it may be that African Americans less often have ADHD but more often have severe cases of the disorder. As an analogy, Gershon (2002) concluded after a thorough literature review that girls with ADHD had lower levels of inattention, impulsivity,

hyperactivity, and disruptive problems but more intellectual impairments and internalizing problems than boys with ADHD. Thus, ADHD is impairing for both boys and girls, though it does not necessarily manifest itself in the same way across gender. Could analogous differences hold across race?

Arnold et al. (2003) reviewed this question in the MTA sample; they found that of the children diagnosed with ADHD at baseline, African Americans had significantly more mean symptoms (2.28) than Caucasian children (2.11, $p<.05$). However, those findings also may be confounded with treatment-seeking effects in that African Americans may be more reluctant to seek treatment, and thus present for treatment (or treatment related research) only when they experience relatively severe symptoms.

Samuel et al. (1998) examined a small sample of 43 African American children. Nineteen were diagnosed with ADHD by DSM-III-R criteria (referred by psychiatric and pediatric sources), and 24 African American children had no ADHD diagnosis. These researchers used “ethnically sensitive methods” to comprehensively evaluate the children, in that the study's methodology was reviewed for cultural appropriateness by a panel of African American professionals; assessments were structured interviews rendered by African American raters who were trained in cultural sensitivity (using the ethnic validity model developed by Tyler, Brome, & Williams, 1991), and blind to child diagnosis.

They found higher levels of comorbid psychopathology (Oppositional Defiant Disorder, severe Major Depression, Bipolar Disorder, and Separation Anxiety) in African American children with ADHD than in African American controls, which is similar to what is typically seen in Caucasian samples. However, when compared to results of a previous study of Caucasian children using nearly the same assessment battery (Biederman et al., 1996), rates of comorbid anxiety disorders and other disruptive behavior were lower in the African American ADHD group, whereas rates of mood disorders were consistent across racial groups for youth with ADHD. Because these studies relied on youth identified in treatment settings, they could reflect a tendency of African American youth to be more resistant or unable to seek treatment, only doing so when symptoms are severe. Alternatively, Caucasian youth may be more likely to seek treatment and therefore reflect a broader spectrum of symptom severity.

This limited literature on symptom severity in African Americans only scratches the surface as to whether ADHD manifests in a unique way in African Americans or whether some other variable than lack of treatment access accounts for differences in symptom severity or prevalence. A survey of individuals in the community that assesses ADHD more comprehensively (i.e., on a symptom as well as a diagnostic level, with data to describe symptom severity and subtype) would be needed to answer this point. If ADHD symptoms are more severe or accompanied by different patterns of comorbidity in African Americans, this could explain higher behavior ratings, but not lower diagnostic prevalence.

2.1.3. C. Are African Americans exposed to more risk factors that contribute to ADHD?—Another possibility is that African American youth exhibit more ADHD symptoms because they are exposed to more ADHD-related risk factors. Risk factors

associated with the development of ADHD and related pathology in the general population include low SES, juvenile detainee status, prenatal marijuana exposure, and exposure to environmental toxins (Arnold et al., 2003; Bazargan et al., 2005; DuPaul et al., 1998; Epstein et al., 2005). African American youth may be exposed to these risk factors at higher rates than other youth. The aforementioned risk factors may account for higher prevalence of ADHD in African Americans. Generally, low SES influences the available health care options for individuals. For example, African American women and Caucasian women have similar rates of mammography screening, but African American women have a higher rate of death from breast cancer (Kendall & Hatton, 2002). It may also be that African Americans have a greater density of risk factors; for example, Breslau and Chilcoat (2000) found that low birth weight was associated with a tripling of risk for ADHD in a mostly African American, inner city sample but not in a mostly Caucasian, suburban sample.

African Americans living in public housing reportedly have a higher incidence of ADHD than in the population as a whole (19%; Bazargan et al., 2005). This was assessed using a survey where parents were asked to indicate whether their child has been diagnosed with ADHD. This rate is high compared to the pooled rate of 5% shown in Table 2. In contrast, Teplin, Abram, McClelland, Dulcan, and Mericle (2002) found a 17% incidence of ADHD in African American child and adolescent juvenile detainees using a semi-structured DSM-based interview, compared to approximately 21% in non-Hispanic Caucasians. However, these rates are based on DSM-III-R diagnoses without the age of onset criterion and rely on self report only.

Exposure to environmental contaminants has been associated with a number of developmental disabilities including impaired intellect and behavior (Stein, Schettler, Wallinga, & Valenti, 2002). Lead, one of the most thoroughly studied environmental toxins, is linked to impaired attention, hyperactivity, and aggression even at low levels of exposure (Stein et al., 2002). According to the Center for Disease Control, high level lead exposure (> 10 ug/dL) affects 36% of inner-city African Americans (compared to 4% of American children overall) (CDC, 2000). Mercury and polychlorinated biphenyls (PCBs) have also been implicated in the impairment of development that could result in problems with attention, memory, language, and behavioral non-compliance (Stein et al., 2002), although links to ADHD-like symptoms are less clear cut than for lead, in humans. The extent to which increased environmental risk lends to the observed high rate of ADHD behavior in African Americans remains in need of study. If lead exposure, for example, leads to increased incidence of ADHD behavior, then one would expect some increased behavioral problems in African American youth.

2.1.4. D. Family and genetic etiology by race—Little is known about whether the genetic structure of ADHD is similar in African American youth as in other groups. ADHD is familial, thus a similar structure of genetic and environmental influences across groups would be reassuring in suggesting that ADHD in African American youth is the same or similar entity to what it is in Caucasian youth. No twin or adoption studies of ADHD in African American youth are extant; most twin studies of ADHD have had few African American participants (Mazei-Robison, Couch, Shelton, Stein, & Blakely, 2005). Only one study examined the pattern of familiality among African Americans. Samuel et al. (1999)

studied familial effects in 89 first-degree relatives of African American ADHD probands diagnosed by DSM-III-R versus with no ADHD. The relatives had increased risk for ADHD as well as Oppositional Defiant Disorder, Antisocial Personality Disorder, Major Depressive Disorder, Generalized Anxiety Disorder, and substance use disorders, compared to relatives of African Americans without ADHD. This is similar to the findings in Caucasians.

Molecular genetic work also has not been conducted. Some key genes have different allele frequencies, or even different alleles, in African American than Caucasian populations (e.g., the dopamine and serotonin transporters) (Mazei-Robison et al., 2005; Williams et al., 2003). Molecular studies are sometimes forced to exclude African Americans to avoid this confound; studies with large enough samples to look at transmission in family-based molecular designs will be helpful.

2.2. II. Empirically based assessment and treatment of ADHD in African American youth

2.2.1. A. Construct validity of ADHD using mainstream behavior rating scales

—The key question here concerns whether ADHD is evaluated appropriately using current methods, in African Americans. Clinicians are obliged to consider several factors to arrive at a diagnosis of ADHD. Some of these factors include the heterogeneity of symptom presentation, cross-setting symptom display, integration of input from multiple informants, history, competing clinical explanations, and impairment, as well as information from ratings and interviews (Bailey & Owens, 2005; Barkley, 2006).

Most cost effective are standardized rating scales (Pelham et al., 2005) and so they are often the instrument of choice in research surveys. Widely used scales include the ADHD Rating Scale (DuPaul et al., 1998), Conners (1997) Rating Scale-Revised, the Achenbach Child Behavior Checklist (CBCL), Teacher Report Form (TRF), and Youth Self Report (YSR) (Achenbach, 1991b), and others (Hinshaw & Nigg, 1999; Pelham et al., 2005). A simple first step is to determine whether the ADHD symptom structure is valid in African American youth using these ratings measures; if it is, further work on other clinical criteria should follow.

Two studies assessed the validity of teacher ratings using versions of the ADHD Rating Scale (an 18-item scale based on DSM-IV items). Reid et al. (1998) examined ratings in a sample of 1359 Caucasian and 381 African American males ages 5–18 years. Unsurprisingly, descriptive analyses reflected higher teacher ratings of all ADHD symptoms in African Americans in all age groups. Different distributions were observed across racial groups, such that African Americans had a more flat distribution of scores whereas the Caucasian American distribution was positively skewed. This resulted in a higher proportion of scores at the high end of the scales in the African American group, and thus different diagnostic cut points by race if cut points were to be based on within-race percentiles.

Additional analyses suggested that the scale items were not structured in the same way across groups. Structural equation modeling showed that the same underlying factor structure was suitable for the two groups, but that the constructs, while similar on the surface, were not equivalent. Differences in item uniqueness were found across groups for 6

items. This suggests that relationships between scale items may differ by race, calling into some question the equivalence of meaning of a given scale score across groups.

To find out why, the authors conducted multidimensional scaling analyses, which revealed two dimensions: an ADHD and a rater dimension, suggesting that group differences were due to the second dimension rather than the first. This implied that teachers had different perceptions of behavior in African American than Caucasian children. The authors proposed that perhaps a halo effect accounted for high ratings of African Americans, such that raters are more likely to endorse all symptoms in African Americans (evidenced by low unique variance in the African American group). These findings should be interpreted cautiously because SES (not included in analyses) may have influenced relationships in addition to effects of racial differences.

Epstein, March, Conners, and Jackson (1998) examined the Conners' (1973) Teacher Rating Scale in 1027 children (609 Caucasian and 418 African American, ages 10–16 years, 50% male); comparable to the total school population in the studied area, and had similar scores in a normative sample of like demographics. Factor analyses were used to generate separate factor solutions for African American males, African American females, Caucasian males, and Caucasian females. Factor structures were then compared across racial groups (within gender).

A conduct problems factor was identified for both genders and races, and males evidenced three secondary factors: hyperactivity, social problems, and anxious/passive. However, an antisocial behavior factor was seen in African American males but not in Caucasian males. Specifically, items involving lying, stealing, and destructiveness did not load on the Conduct Problems factor for African Americans (as they did for Caucasians), rather, they loaded on their own Antisocial factor for African Americans. In females, among African Americans the hyperactivity factor loaded on the primary conduct problems factor, and the inattention factor was absent; among Caucasians the hyperactivity, conduct problems, and inattention factors were separate entities. Overall, these results suggest that the factor structure for males is similar for ADHD but not for antisocial behaviors across races, but the factor structure involving the relationship between ADHD and externalizing behavior differed across race groups for girls.

Reid et al. (2001) studied the construct and normative equivalence of the venerable teacher IOWA Conners’ Rating Scale (IOWA; Pelham, Milich, Murphy, & Murphy, 1989). The sample of 3998 children (2124 African American and 1874 Caucasian American) ages 5–11 years was drawn from elementary schools in an urban school district that were defined “high-risk schools” due to increased percentages of school absences, low SES, and students below grade-level. Group mean data from this study are included in Table 1. The IOWA Conners' includes an inattention/over-activity subscale and an aggression subscale, well supported psychometrically at the time the scale was created. An exploratory factor analysis showed that the two factors were recovered for Caucasian and African American youth. Confirmatory factor analyses using structural equation modeling also revealed that the two-factor model was suitable for both groups. Structural equation modeling was also used to test the fit of the two-factor model across African American and Caucasian American girls

and boys. Construct equivalence was established across African Americans and Caucasian Americans for the teacher IOWA Conners' Rating Scale in a high-risk school sample.

In light of the rather mixed set of findings that emerge from these studies, it is striking that they appeared in the first five years after the Samuel et al. (1997) review, but none thereafter. Overall, the very few large-sample studies to examine factor equivalence produced rather equivocal results, leaving some question as to whether the ADHD factor structure generalizes across race, particularly for girls.

2.2.2. B. Adequacy of existing scales and status of alternative assessment instruments—Lambert, Rowan, Lyubansky, and Russ (2002) questioned the content and cultural validity of rating scales for use with African American children, focusing on the CBCL. In a study of clinical records of 1605 African American children (ages 4–18), they used presenting problems that were recorded by clinicians during initial interviews with parents, and mapped them onto the 118 items of the CBCL. Ninety-nine percent of African American parents endorsed fewer than half of the items, whereas 25% reported at least one of 24 behavior problems that were not a match to any of the items on the CBCL. This led the authors to question whether problem coverage was adequate for this population using the CBCL. Altering the coverage naturally could alter the factor structure. These results should be interpreted with caution in relation to ADHD, as the reported problems apply to a number of syndromes, not just ADHD. Also of note, the sample included only children in the state of Michigan, and SES data were unavailable.

One race-specific measure exists. It may hold promise but has yet to be thoroughly validated. The Terry, an African-American version of the Dominic-R (Valla, Bergeron, Bidaut-Russell, St-Georges, & Gaudet, 1997), involves pictorial representations of a child displaying symptoms that are approximately congruent to DSM-III-R and DSM-IV diagnostic criteria for a variety of mental disorders (including ADHD). The respondent is asked whether the child has behaved like the African American boy, Terry, in the picture.

Psychometric properties of the Terry were examined in a study of 36 inner-city African American boys ages 5–13 (Bidaut-Russell, Valla, Thomas, Bergeron, & Lawson, 1998). The small sample size is an obvious limitation, and external validity, a major problem with children's self report of ADHD (Pelham et al., 2005), was not addressed. Overall, the authors concluded that the Terry is a reliable and culturally sensitive instrument. However, more support for the validity of this instrument and its correlation with more widely used instruments, with impairment, and predictive validity are needed.

2.2.3. C. Treatment of ADHD in African American youth—Effective treatments have been established for ADHD; however access to appropriate care appears to differ by race such that African American children are less likely to receive treatment than Caucasian children (Bussing et al., 2003; Zito, Safer, dosReis, Magder, & Riddle, 1997). Other literature suggests that African Americans prefer a certain type of treatment protocol. Differential rates of treatment response may be related to the type of treatment, availability of care, insurance status, or beliefs about behavior and its treatment (including varying degrees of tolerance for symptoms) across groups.

Arnold et al. (2003) examined the effects of ethnicity on treatment attendance and treatment outcome in the MTA study (see footnote 1). Participants were 579 boys with a mean age of 8.5 years who met criteria for ADHD-C, including 111 African Americans. Ethnic minority boys (various races) benefited significantly from multimodal treatment (Beh + MedMgt) when compared to medication treatment alone (d = .36) after 14 months. This finding could be due to a preference among ethnic minorities for a direct, structured therapeutic approach with explicit interventions and immediate symptom relief (Satterfield, 1998). Additionally, ethnic minority families cooperated with the Combined treatment modality.

Although there is some mixed evidence that African American youth may tend to drop out of parent-child empirically supported behavioral treatment more than Caucasian youth (Capage et al., 2001; Kazdin et al., 1995), they may respond as well to school-based interventions when they do not drop out (Fabiano & Pelham, 2003; Hussey & Guo, 2003). In those studies, it should be noted that the number of youth with ADHD was either too small or the extent to which findings would pertain to youth with ADHD was unclear. More work on whether drop out rates vary with treatment type or with diagnosis across race groups is needed, as are additional cross-race effectiveness studies using behavioral approaches with ADHD.

It may be speculated that African Americans are reluctant to elect medication for treatment of mental health problems. For example, research suggests that African Americans may be more sensitive than Caucasians to the effects of psychoactive medication, as they respond more quickly than Caucasians to antidepressants (Brown, Schulberg, Sacco, Perel, & Houck, 1999). This may lead to overdosing, increased side effects, and thus reluctance in African Americans to use psychotropic medication.

Even so, stimulants have been shown to benefit African Americans with ADHD. Hazel-Fernandez, Klorman, Wallace, and Cook (2006) showed that methylphenidate enhances executive functions (i.e., precision, planning, and persistence) in African American children with ADHD, which compares to findings in Caucasian samples. Additionally, Brown and Sexson (1988) found that higher doses of methylphenidate were associated with better behavioral and academic outcomes related to attention and impulsivity. However, this study was a controlled trial with few African American male adolescent participants (N = 11), and only examined short-term effects of the medication. Additionally, the authors reported a significant increase in diastolic blood pressure and reported side effects with increased dosage of methylphenidate. It was unclear whether these effects could be explained by the increased risk for hypertension in African Americans. Regardless of differential side effects, African Americans may be averse to the idea of medication treatment for ADHD.

In a review of the past 10 years of literature on disruptive behavior disorders, Burke, Loeber, and Birmaher (2002) found that successful treatments involve multiple levels of intervention with the child, family, and school. Few treatment studies intervened on all three of these levels, but those that did appeared to be particularly efficacious for African Americans.

2.2.4. D. How does insurance status affect ADHD treatment for African Americans?—If access to care is a key moderator, then insurance status may be a proxy

for race related ADHD effects. Children with Medicaid or private insurance were more likely to receive an ADHD diagnosis than those with no insurance (Stevens et al., 2005). Of the children with an ADHD diagnosis, those with some form of health insurance had at least one stimulant prescription compared to children with ADHD who did not have insurance. Generally, African Americans with ADHD were less apt to take medication than Caucasians with ADHD (Chen & Chang, 2002; Hahn, 1995; LeFever, Dawson, & Morrow, 1999; Pastor & Reuben, 2005; Safer & Malever, 2000; Stevens et al., 2005). However, privately insured African American children, who did take stimulant medication, tended to have a higher dosage (Lipkin, Cozen, Thompson, & Mostofsky, 2005). Based on these findings, it appears that insurance status differentially affects ADHD diagnosis and access to stimulant medication by race, such that disparities in ADHD-related care seem more prominent for African American children. Higher doses of stimulant medication in privately insured African American children than Caucasian children with similar coverage may suggest more severely impairing symptomology or more aggressive treatment is occurring in the African American youth.

2.2.5. E. Parent perceptions and explanatory models—Parents' knowledge and beliefs about ADHD may also explain low treatment rates in African Americans. Parents' understandings of ADHD, termed “explanatory models,” have been found to vary by ethnicity in at least one study (Bussing, Schoenberg, Rogers, Zima, & Angus, 1998). Investigators interviewed 127 parents of children in grades 2–4 in the special education program for children with learning disabilities or emotional problems. African American parents were more likely to refer to their child's condition as a behavior problem or as an inherent characteristic that implied that the child was “bad,” rather than referring to it as a medical syndrome as did most Caucasian parents. African American parents were also more likely to anticipate a shorter duration of the problem behavior, unlike Caucasian parents who expected a lifelong course.

In another study, the same group found that African American parents were less informed about ADHD compared to Caucasian parents (Bussing, Schoenberg, & Perwien, 1998), and more likely than Caucasian parents to attribute ADHD to causes that are not linked to the disorder (such as excessive dietary sugar). These differences are suggestive of a lack of information on ADHD and its treatment, as they are in line with former, more stereotypical thinking on the condition (i.e. views that disruptive children can simply stop behaving badly, or that the child's behavior problems solely reflect bad parenting). Both Bussing et al. studies examined explanatory models of ADHD in a clinical population; however it would be useful to know whether African American parents of children in regular education have similar perspectives, or if some degree of hypersensitivity is present in the clinical sample.

2.2.6. F. How do African American parents view help seeking and treatment? —Following perceptions about ADHD, it makes sense to ask about views of help and treatment seeking. Consistent with our Table 2 results, Bussing et al. (2003) found that African American children were less than half as likely to be assessed, diagnosed, and treated for ADHD as Caucasians.

The researchers surveyed the parents to determine common barriers to help seeking and found that across race the most commonly endorsed barriers were: system barriers (i.e. not knowing where to go for help), no perceived need (i.e. expecting the problem to improve without intervention — even when children met DSM-IV criteria for ADHD), and negative expectations. African American parents endorsed more negative treatment expectations than Caucasian parents, suggesting a possible lack of trust and disparities in the quality and accessibility of care.

Davison and Ford (2001) found that African Americans professionals are less likely to diagnose ADHD or prescribe stimulant medication treatment due to a socially constructed view of the disorder. Investigators conducted a study of perceptions of ADHD in 25 African American parents, educators, and medical professionals in a mid-Western African American community. According to the researchers, this social perspective involves distrust of the educational system, perceived lack of cultural awareness on the part of Caucasian educators, perceived social stigma of the diagnostic label, concern about addiction to drug treatments, and political pressure.

These socially constructed views may explain why African American parents were less likely than Caucasian parents to include the school in treatment plans (Bussing et al., 1998). In a subsequent study, Bussing, Gary, Mills, and Garvan (2003) examined explanatory models in a stratified random sample of 182 parents of elementary school students. Results showed that African American parents were less likely than Caucasian parents to involve the school in the problem-identification process or to prefer school interventions, and African American parents expressed fewer concerns about ADHD-related school difficulties. Interestingly, in a more recent study, Bussing et al. (2005) found that African American children were more likely than Caucasians to receive special school services once possible confounds were adjusted in multivariate analyses. This is consistent with findings that show that schools were the largest provider of mental health care to both African American and Caucasian children (Angold et al., 2002).

Surprisingly few studies have examined parent perceptions of ADHD in African Americans recently. This is an important gap, because such perceptions are likely to rapidly evolve as the society continues to disseminate various kinds of information about ADHD and related topics. Nonetheless, the existing studies suggest that African American parents have a different perception of ADHD than Caucasian American parents, which involves lower thresholds for problem recognition and treatment seeking. The studies suggest the potential utility of psychoeducational interventions to increase treatment utilization such as community education on ADHD diagnosis and intervention as well as training and increased awareness of cultural issues for school employees and community service providers.

3. General discussion

In the past decade, the research evaluating ADHD in African American youth has moved from anecdotal to systematic in some domains. Though the literature on ADHD in African Americans remains relatively small, it has grown to the point that some conclusions can be adduced.

Our review clarifies to a new extent that African American youth are rated by parents and teachers as having more ADHD problems than Caucasian youth, by just under half of a standard deviation. This is an important phenomenon requiring more investigation as to its causes. The clarity of this pattern should lessen debate about whether there are differences in how these youth are perceived or rated in the United States. The difference in the observed rate of ADHD symptoms between African American and Caucasian youth requires investigation as to its cause. Our review provides a starting place for considering why these ratings differences might exist.

One cause of ratings differences may be that teacher ratings over-estimate ADHD behaviors in African American versus Caucasian youth (note that four of the five studies were teacher ratings). In our review, the only study to examine observer versus teacher ratings in the USA (Epstein et al., 2005) suggested that the teacher ratings were veridical. Further, the one study of parent ratings available also showed higher symptom ratings in African American youth. Thus, the limited evidence does not suggest teacher over-endorsement, but rather true elevated behavior problems in African American youth. Clearly, though, more studies of observations and of parent ratings could overturn this tentative conclusion. Future classroom-based studies should evaluate the homogeneity of scores within classrooms (by calculating the intra-class correlation coefficient) and help determine whether differences are driven by teacher bias or actual behavioral variation (Shinn & Rapkin, 2000).

A second possibility, then, is that differences in SES account for ratings differences, with lower SES children tending to show more behavior problems. However, this does not seem to be the case, as studies in our review (Arnold et al., 2003; DuPaul et al., 1998) found that racial differences in ratings remained after controlling for SES.

A third possibility is that African American youth really do exhibit more of these types of behaviors. One reason African American youth might exhibit more ADHD symptoms results from high exposure to etiological risk agents. African American youth tend to have high rates of low birth weight (Breslau & Chilcoat, 2000), lead exposure (Stein et al., 2002), and a range of other early developmental insults (DuPaul et al., 1998; Epstein et al., 2005) that go well beyond what is captured by SES and each of which could increase ADHD-related behaviors. Future research should assess the extent to which these etiological risks play a role in producing elevated rates of ADHD symptoms among African American youth.

The second major conclusion from our review was that, despite being rated as having more ADHD symptoms, African American youth are diagnosed with ADHD at only two thirds the rate of Caucasian youth. Again, this finding was quite clear and is a new “fact” established over the last 10 years. The question now is: why would this be? The studies reviewed here provide some indication of why it might be that rates of ADHD diagnoses are so much lower among African Americans than Caucasians. In light of our review of the evidence, it seems unlikely that African Americans are exhibiting fewer symptoms. However, it may be that these symptoms do not have the same disabling meaning in African American as Caucasian youth. Another, more parsimonious possibility is that African American youth with ADHD are under-identified, perhaps due to less access to qualified health care services, or lack of willingness to seek out these services (Bussing et al., 2003).

It may be fruitful to consider why many African American youth do not seek treatment for ADHD or have access to it. Our review suggests that treatment ineffectiveness does not provide a convincing explanation for low rates of treatment among African Americans; however, we acknowledge that work is needed to determine whether African American youth experience more side effects at typical doses of stimulant medication, leading to lower compliance. Based on the literature in our review, parents' understanding of ADHD may play an important role in low rates of help-seeking and stimulant medication use, as well as reduced school involvement in treatment. Our review suggests that African American parents may not respond to symptoms of ADHD in a similar fashion and as early as Caucasian parents. From this perspective, the results we present in Table 1 and Table 2 are necessarily connected. Lower identification and treatment means more symptoms in these youth. African American youth may take longer to have ADHD-related problems addressed, resulting in perceptibly higher symptom severity on average.

To the extent that parent perspectives on ADHD influence treatment seeking, there is an urgent need for better education of the African American community about ADHD, as well as development of treatment approaches that are perceived as acceptable to parents. African Americans are believed to favor treatment protocols that are direct, structured, and based on symptom remission such as behavioral approaches (Satterfield, 1998). Sensitivity to the cultural issues that are relevant to African Americans should inform the development of culturally competent approaches to assessment, diagnosis, and treatment of ADHD (Bailey & Owens, 2005; Bussing et al., 2003; Davison & Ford, 2001).

Finally, with regard to clinical implications, the clinical assessment of ADHD should be a multifaceted process with data collected from parent and teacher, as well as neuropsychological and observational data on the child (Barkley, 1990, 2006). Few studies of race effects have used multiple ADHD assessment methods. It is also notable that none of the reviewed research examined ethnic differences in neuropsychological performance, although neuropsychological deficits are known to be associated with ADHD (Nigg, Blaskey, Huang-Pollock, & Rappley, 2002). Notably, controlling for acculturation has been shown to account for ethnic differences in neuropsychological test performance (Manly et al., 1998).

4. Conclusion

The last major literature review on ADHD in African Americans (Samuel et al., 1997) found sparse and inconclusive information on the role of race and ADHD. At the present juncture and based on a larger pool of empirical work than was available in 1997, clearer conclusions are possible. Nevertheless, these conclusions are based on a relatively small database of available empirical studies of ADHD prevalence. Our review found that African American youth are rated as having more ADHD symptoms, yet are less often diagnosed with ADHD than Caucasian youth. Moreover, differential rates of symptoms and diagnoses do not appear to be explained by rater bias or SES, but rather by parent beliefs about ADHD (lack of information), negative treatment experiences (perhaps including differential medication side effects), and lack of treatment access. It remains unclear that existing assessment tools adequately capture ADHD manifestation in African Americans.

In all, the field has begun to find traction toward a more clear understanding of ADHD in African Americans. Nevertheless, the next course of empirical investigations must turn to a new set of questions. These questions must include exploration of the role of etiological risk factors on ADHD and on how aspects of African American culture, identity, and experience influence perception of ADHD and its treatment. An understanding of which etiological and cultural mechanisms account for observed race differences in ADHD would inform more appropriate assessment, diagnostic, and treatment practices for African American children.

REFERENCES

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

Achenbach, T. Manual for the Young Adult Self Report and Young Adult Behavior Checklist. University of Vermont Department of Psychiatry; Burlington, VT: 1991.

Angold A, Erkanli A, Farmer EMZ, Fairbank JA, Burns BJ, Keeler G, et al. Psychiatric disorder, impairment, and service use in rural African American and White youth. Archives of General Psychiatry. 2002; 59(10):893–904. [PubMed: 12365876]

APA. Diagnostic and statistical manual of mental disorders: DSM-IV-TR. 4th. American Psychiatric Association text revision ed; Washington, DC: 2000.

Arnold LE, Elliot M, Sachs L, Bird H, Kraemer HC, Wells KC, et al. Effects of ethnicity on treatment attendance, stimulant response/dose, and 14-month outcome in ADHD. Journal of Consulting and Clinical Psychology. 2003; 71(4):713–727. [PubMed: 12924677]

Bailey RK, Owens DL. Overcoming challenges in the diagnosis and treatment of attention-deficit/ hyperactivity disorder in African Americans. Journal of the National Medical Association. 2005; 97(10 Suppl):5s–10s. [PubMed: 16350600]

Barkley RA. A critique of current diagnostic criteria for attention deficit hyperactivity disorder: Clinical and research implications. Journal of Developmental and Behavioral Pediatrics. 1990; 11(6):343–352. [PubMed: 2289969]

Barkley, RA. Attention deficit hyperactivity disorder: a handbook for diagnosis and treatment. 3rd. Guilford Press; New York: 2006.

Barkley RA, Fischer M, Smallish L, Fletcher K. Young adult follow-up of hyperactive children: antisocial activities and drug use. Journal of Child Psychology and Psychiatry. 2004; 45(2):195–211. [PubMed: 14982236]

Bax L, Yu L, Ikeda N, Moons KGM. A systematic comparison of software dedicated to meta-analysis of causal studies. BMC Medical Research Methodology. 2007; 7:40. [PubMed: 17845719]

Bax L, Yu L, Ikeda N, Tsuruta H, Moons KGM. Development and validation of MIX: comprehensive free software for meta-analysis of causal research data. BMC Medical Research Methodology. 2006; 6:50. [PubMed: 17038197]

Bazargan M, Calderon JL, Heslin KC, Mentes C, Shaheen MA, Ahdout J, et al. A profile of chronic mental and physical conditions among African-American and Latino children in urban public housing. Ethnicity & Disease. 2005; 15(4):S5–3–9. Suppl 5. [PubMed: 16312939]

Biederman J, Faraone SV, Mick E, Wozniak J, Chen L, Ouellette C, et al. Attention deficit hyperactivity disorder and juvenile mania: an overlooked comorbidity? Journal of the American Academy of Child and Adolescent Psychiatry. 1996; 35:997–1008. [PubMed: 8755796]

Bidaut-Russell M, Valla JP, Thomas JM, Bergeron L, Lawson E. Reliability of the Terry: a mental health cartoon-like screener for African-American children. Child Psychiatry and Human Development. 1998; 28(4):249–263. [PubMed: 9628057]

Bland JM, Altman DG. The odds ratio. British Medical Journal. 2000; 320:1468. [PubMed: 10827061]

Breslau N, Chilcoat HD. Psychiatric sequale of low birth weight at 11 years of age. Society of Biological Psychiatry. 2000; 47:1005–1011.

Brown C, Schulberg HC, Sacco D, Perel JM, Houck PR. Effectiveness of treatments for major depression in primary medical care practice: A post hoc analysis of outcomes for African

American and white patients. Journal of Affective Disorders. 1999; 53(2):185–192. [PubMed: 10360414]

Brown RT, Sexson SB. A controlled trial of methylphenidate in black adolescents. Attentional, behavioral, and physiological effects. Clinical Pediatrics. 1988; 27(2):74–81. [PubMed: 3338232]

Burke JD, Loeber R, Birmaher B. Oppositional defiant and conduct disorder: a review of the past 10 years, part II. Journal of the American Academy of Child and Adolescent Psychiatry. 2002; 41:1275–1293. [PubMed: 12410070]

Bussing R, Gary FA, Mills TL, Garvan CW. Parental explanatory models of ADHD: gender and cultural variations. Social Psychiatry and Psychiatric Epidemiology. 2003; 38(10):563–575. [PubMed: 14564385]

Bussing R, Schoenberg NE, Perwien AR. Knowledge and information about ADHD: evidence of cultural differences among African-American and white parents. Social Science & Medicine. 1998; 46(7):919–928. [PubMed: 9541077]

Bussing R, Schoenberg NE, Rogers KM, Zima BT, Angus S. Explanatory models of ADHD: Do they differ by ethnicity, child gender, or treatment status? Journal of Emotional and Behavioral Disorders. 1998; 6(4):233–242.

Bussing R, Zima BT, Gary FA, Garvan CW. Barriers to detection, help-seeking, and service use for children with ADHD symptoms. The Journal of Behavioral Health Services & Research. 2003; 30(2):176–189. [PubMed: 12710371]

Bussing R, Zima BT, Mason D, Hou W, Garvan CW, Forness S. Use and persistence of pharmacotherapy for elementary school students with attention-deficit/hyperactivity disorder. Journal of Child & Adolescent Psychopharmacology. 2005; 15(1):78–87. [PubMed: 15741789]

Calhoun ML. Teachers' causal attributions for child's hyperactivity: race, socioeconomic status, and typicalness. Perception and Motivation. 1975; 41:195–198.

Capage LC, Bennett GM, McNeil CB. A Comparison between African American and Caucasian children referred for treatment of disruptive behavior disorders. Child and Family Behavior Therapy. 2001; 23:1–14.

CDC. HIV/AIDS Surveillance Report: HIV Infection and AIDS in the United States and Dependent Areas. 2007 2005, Vol. 17. (pp.) Revised Ed, June 2007. Retrieved July 8, 2007 from http://www.cdc.gov/hiv/topics/surveillance/resources/reports/2005report/default.htm.

CDC. Racial/ethnic disparities in diagnoses of HIV/AIDS — 33 states, 2001–2004. Morbidity and Mortality Weekly Report. 2006; 55:121–125. [PubMed: 16467777]

CDC. Revised Final FY 1999 Performance Plan And FY 2000 Performance Plan XII. Environmental and Occupational Health Plan, Lead Poisoning. 2000 Retrieved November 12, 2006.

Chen AY, Chang RK. Factors associated with prescription drug expenditures among children: an analysis of the Medical Expenditure Panel Survey. Pediatrics. 2002; 109:728–732. [PubMed: 11986428]

Conners CK. Rating scales for use in drug studies with children [Special issue/Pharmacotherapy of Children]. Psychopharmacology Bulletin. 1973; 9:24–29.

Conners, CK. Conners' Rating Scales–Revised: Technical manual. Multi-Health Systems; North Tonawanda, NY: 1997.

Davison JC, Ford DY. Perceptions of attention deficit hyperactivity disorder in one African American community. Journal of Negro Education. 2001; 70(4):264–274.

Deater-Deckard K, Dodge KA, Bates JE, Pettit GS. Physical discipline among African American and European American mothers: links to children's externalizing behaviors. Developmental Psychology. 1996; 32(6):1065–1072.

dosReis S, Zito JM, Safer DJ, Soeken KL. Mental health services for youths in foster care and disabled youths. American Journal of Public Health. 2001; 91(7):1094–1099. [PubMed: 11441737]

DuPaul GJ, Anastopoulos AD, Power TJ, Reid R, Ikeda MJ, McGoey KE. Parent ratings of attention-deficit/hyperactivity disorder symptoms: factor structure and normative data. Journal of Psychopathology and Behavioral Assessment. 1998; 20(1):83–102.

Epstein JN, March JS, Conners CK, Jackson DL. Racial differences on the Conners' Teacher Rating Scale. Journal of Abnormal Child Psychology. 1998; 26(2):109–118. [PubMed: 9634133]

Epstein JN, Willoughby M, Valencia EY, Tonev ST, Abikoff HB, Arnold LE, et al. The role of children's ethnicity in the relationship between teacher ratings of attention-deficit/hyperactivity disorder and observed classroom behavior. Journal of Consulting & Clinical Psychology. 2005; 73(3):424–434. [PubMed: 15982140]

Fabiano GA, Pelham WE Jr. Improving the effectiveness of behavioral classroom interventions for attention-deficit/hyperactivity disorder: a case study. Journal of Emotional and Behavioral Disorders. 2003; 11(2):124–130.

Friedman S, Paradis C, Hatch M. Characteristics of African-American and White patients with panic disorder and agoraphobia. Hospital and Community Psychiatry. 1994; 45:798–803. [PubMed: 7982696]

Gershon J. A meta-analytic review of gender differences in ADHD. Journal of Attention Disorders. 2002; 5(3):143–154. [PubMed: 11911007]

Gordon M, Antshel K, Faraone S, Barkley R, Lewandowski L, Hudziak JJ, et al. Symptoms versus impairment: the case for respecting DSM-IV's Criterion D. Journal of Attention Disorders. 2006; 9(3):465–475. [PubMed: 16481663]

Hahn BA. Children's health: racial and ethnic differences in the use of prescription medications. Pediatrics. 1995; 95:727–732. [PubMed: 7724312]

Hazel-Fernandez LA, Klorman R, Wallace JM, Cook S. Methylphenidate improves aspects of executive function in African American children with ADHD. Journal of Attention Disorders. 2006; 9(4):582–589. [PubMed: 16648225]

Hinshaw, SP.; Nigg, JT. Behavior rating scales in the assessment of disruptive behavior disorders in childhood. In: Shaffer, D.; Richters, J.; Lucas, CP., editors. Diagnostic assessment in child and adolescent psychopathology. Guilford; New York: 1999. p. 91-126.

Hussey DL, Guo S. Measuring behavior change in young children receiving intensive school-based mental health services. Journal of Community Psychology. 2003; 31(6):629–639.

Kazdin AE, Stolar M, Marciano P. Risk factors for dropping out of treatment among White and Black families. Journal of Family Psychology. 1995; 9:402–417.

Kendall J, Hatton D. Racism as a source of health disparity in families with children with attention deficit hyperactivity disorder. Advances in Nursing Science. 2002; 25(2):22–39. [PubMed: 12484639]

Kessler RC, McGonagle KA, Zhao S, Nelson CB, Hughes M, Eshleman S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. Archives of General Psychiatry. 1994; 51:8–19. [PubMed: 8279933]

Lambert MC, Rowan GT, Lyubansky M, Russ CM. Do problems of clinic-referred African-American children overlap with the child behavior checklist? Journal of Child and Family Studies. 2002; 11(3):271–285.

Lambert NM, Sandoval J, Sassone D. Prevalence of hyperactivity in elementary school children as a function of social system definers. American Journal of Orthopsychiatry. 1978; 48:446–463. [PubMed: 307912]

Langsdorf R, Anderson R, Waechter D, Madrigal J, Juarez L. Ethnicity, social class, and perception of hyperactivity. Psychology in the Schools. 1979; 16:293–298.

LeFever GB, Dawson KV, Morrow AL. The extent of drug therapy for attention deficit-hyperactivity disorder among children in public schools. American Journal of Public Health. 1999; 89:1359–1364. [PubMed: 10474553]

Lipkin PH, Cozen MA, Thompson RE, Mostofsky SH. Stimulant dosage and age, race, and insurance type in a sample of children with attention-deficit/hyperactivity disorder. Journal of Child & Adolescent Psychopharmacology. 2005; 15(2):240–248. [PubMed: 15910208]

Livingston R. Cultural issues in diagnosis and treatment of ADHD. Journal of the American Academy of Child and Adolescent Psychiatry. 1999; 38(12):1591–1594. [PubMed: 10596260]

Loney, J.; Kramer, J.; Milich, R. The hyperactive child grows up: predictors of symptoms, delinquency, and achievement at follow-up. In: Gadow, K.; Loney, J., editors. Psychosocial aspects of drug treatment for hyperactivity. Westview Press; Boulder, Colorado: 1981. p. 381-415.

Manly J, Miller SW, Heaton RK, Byrd D, Reilly J, Velasquez RJ, et al. The effect of African-American acculturation on neuropsychological test performance in normal and HIV-positive individuals. Journal of the International Neuropsychological Society. 1998; 4:291–302. [PubMed: 9623004]

Mann EM, Ikeda Y, Mueller CW, Takahashi A, Tao KT, Humris E, et al. Cross-cultural differences in rating hyperactive-disruptive behaviors in children. American Journal of Psychiatry. 1992; 149(11):1539–1542. [PubMed: 1415822]

Mannuzza S, Klein RG, Bessler A, Malloy P, LaPadula M. Adult outcome of hyperactive boys: educational achievement, occupational rank, and psychiatric status. Archives of General Psychiatry. 1993; 50:565–576. [PubMed: 8317950]

Mazei-Robison MS, Couch RS, Shelton RC, Stein MA, Blakely RD. Sequence variation in the human dopamine transporter gene in children with attention deficit hyperactivity disorder. Neuropharmacology. 2005; 49(6):724–736. [PubMed: 16171832]

Nigg JT, Blaskey LG, Huang-Pollock CL, Rappley MD. Neuropsychological executive functions and DSM-IV ADHD subtypes. Journal of the American Academy of Child and Adolescent Psychiatry. 2002; 41:59–66. [PubMed: 11800208]

Pastor PN, Reuben CA. Racial and ethnic differences in ADHD and LD in young school-age children: parental reports in the National Health Interview Survey. Public Health Reports. 2005; 120(4): 383–392. [PubMed: 16025718]

Pelham WE, Fabiano GA, Massetti GM. Evidence-based assessment of attention deficit hyperactivity disorder in children and adolescents. Journal of Clinical Child and Adolescent Psychology. 2005; 34(3):449–476. [PubMed: 16026214]

Pelham WE, Milich R, Murphy DA, Murphy HA. Normative data on the IOWA Conners' Teacher Rating Scale. Journal of Clinical Child Psychology. 1989; 18(3):259–262.

Polanczyk MD, de Lima MS, Horta BL, Biederman J, Rohde LA. The worldwide prevalence of ADHD: a systematic review and metaregression analysis. American Journal of Psychiatry. 2007; 164:942–948. [PubMed: 17541055]

Reid R, Casat CD, Norton HJ, Anastopoulos AD, Temple EP. Using behavior rating scales for ADHD across ethnic groups: The IOWA Conners. Journal of Emotional and Behavioral Disorders. 2001; 9(4):210–218.

Reid R, DuPaul GJ, Power TJ, Anastopoulos AD, Rogers-Adkinson D, Noll MB, et al. Assessing culturally different students for attention deficit hyperactivity disorder using behavior rating scales. Journal of Abnormal Child Psychology. 1998; 26(3):187–198. [PubMed: 9650625]

Rowland AS, Umbach DM, Stallone L, Naftel AJ, Bohlig EM, Sandler DP. Prevalence of medication treatment for attention deficit-hyperactivity disorder among elementary school children in Johnston County, North Carolina. American Journal of Public Health. 2002; 92(2):231–234. [PubMed: 11818297]

Safer DJ, Malever M. Stimulant treatment in Maryland public schools. Pediatrics. 2000; 106(3):533–539. [PubMed: 10969099]

Samuel VJ, Biederman J, Faraone SV, George P, Mick E, Thornell A, et al. Clinical characteristics of attention deficit hyperactivity disorder in African American children. American Journal of Psychiatry. 1998; 155(5):696–698. [PubMed: 9585726]

Samuel VJ, Curtis S, Thornell A, George P, Taylor A, Brome DR, et al. The unexplored void of ADHD and African-American research: a review of the literature. Journal of Attention Disorders. 1997; 1(4):197–207.

Samuel VJ, George P, Thornell A, Curtis S, Taylor A, Brome D, et al. A pilot controlled family study of DSM-III-R and DSM-IV ADHD in African-American children. Journal of the American Academy of Child & Adolescent Psychiatry. 1999; 38(1):34–39. [PubMed: 9893414]

Satterfield JM. Cognitive behavioral group therapy for depressed, low-income minority clients: Retention and treatment enhancement. Cognitive Behavioral Practice. 1998; 5:65–80.

Shinn, M.; Rapkin, BD. Cross-level research without cross-ups in community psychology. In: Rappaport, J.; Seidman, E., editors. Handbook of community psychology. Kluwer Academic Publishers; Dordrecht, Netherlands: 2000. p. 669-695.

Stein J, Schettler T, Wallinga D, Valenti M. In harm's way: toxic threats to child development. Journal of Developmental and Behavioral Pediatrics. 2002; 23(Suppl. 1):S13–S22. [PubMed: 11875286]

Stevens G. Bias in the attribution of hyperkinetic behavior as a function of ethnic identification and socioeconomic status. Psychology in the Schools. 1981; 18:99–106.

Stevens J, Harman JS, Kelleher KJ. Race/ethnicity and insurance status as factors associated with ADHD treatment patterns. Journal of Child & Adolescent Psychopharmacology. 2005; 15(1):88–96. [PubMed: 15741790]

Teplin LA, Abram KM, McClelland GM, Dulcan MK, Mericle AA. Psychiatric disorders in youth in juvenile detention. Archives of General Psychiatry. 2002; 59(12):1133–1143. [PubMed: 12470130]

Tyler, FB.; Brome, DR.; Williams, JE. Validity, ecology, and psychotherapy: A Psychological Perspective. Plenum; New York: 1991.

Valla JP, Bergeron L, Bidaut-Russell, St-Georges M, Gaudet N. Reliability of the Dominic-R: a young child mental health questionnaire combining visual and auditory stimuli. Journal of Child Psychology and Psychiatry. 1997; 38(6):717–724. [PubMed: 9315981]

Weisz JR, Huey SJ, Weersing VR. Psychotherapy outcome research with children and adolescents: the state of the art. Advances in Clinical Child Psychology. 1998; 20:49–91.

Whaley AL, Geller PA. Toward a cognitive process model of ethnic/racial biases in clinical judgment. Review of General Psychology. 2007; 11(1):75–96.

Williams RB, Marchuk DA, Gadde KM, Barefoot JC, Grichnik K, Helms MJ, et al. Serotonin-related gene polymorphisms and central nervous system serotonin function. Neuropsychopharmacology. 2003; 28(3):533–541. [PubMed: 12629534]

Zito JM, Safer DJ, dosReis S, Magder LS, Riddle MA. Methylphenidate patterns among Medicaid youths. Psychopharmacology Bulletin. 1997; 33(1):143–147. [PubMed: 9133766]

Table 1

ADHD mean behavior rating scale scores in African American and Caucasian racial groups

Study	Reporter/method	African American			Caucasian American			Cohen's *d*	95% CI	*p*	Weights*
		N	Mean	SD	*N*	Mean	SD				
Arnold et al. (2003)	Teacher/SNAP-IV[a]	92	2.28	0.48	92	2.11	0.52	0.34	0.05 to 0.63	<.05	2.72%
Reid et al. (2001)	Teacher/IOWA Conners'[b]	2124	5.33	4.61	1874	3.08	3.88	0.53	0.46 to 0.59	<.001	57.72%
DuPaul et al. (1998)	Parent/ADHD RS-IV[c]	318	6.18	5.94	3999	4.67	4.79	0.31	0.19 to 0.42	<.001	17.61%
Epstein et al. (2005)	Teacher/CTRS-R, TRF, and SNAP-IV[d]	95	1.88	0.46	323	1.74	0.48	0.29	0.06 to 0.52	<.05	4.37%
Reid et al. (1998)	Teacher/ADHD RS-IV[e]	381	10.74	8.35	1359	7.50	7.47	0.42	0.31 to 0.54	<.001	17.58%
Pooled totals		3010			7647			0.45	0.41 to 0.50	<.001	100

Notes:

*A fixed effect model with an inverse variance weighting method was used.

[a]Baseline rating scale scores were used (rather than scores after 14-month treatment).

[b]Mean inattention/overactivity in girls and boys.

[c]Mean inattention and hyp/imp ratings (total *N* only includes African Americans and Caucasian Americans in the sample).

[d]Mean of all teacher ratings (total *N* only includes African Americans and Caucasian Americans in the sample).

[e]Mean inattention and hyp/imp ratings.

Table 2

ADHD prevalence in African American and Caucasian racial groups

Study	*N*	African American prevalence	Caucasian American prevalence	Ln OR	SE	OR	95% CI	*p*	Weights*
Angold et al. (2002)[a]	920	0.02[b]	0.03[b]	−0.43	0.43	0.65	0.28 to 1.49	0.31	1.49%
Rowland et al. (2002)[c]	5645	0.09[d]	0.11[d]	−0.19	0.11	0.83	0.67 to 1.03	0.09	21.79%
dosReis et al. (2001)[e]	10170	0.01	0.02	−0.60	0.18	0.55	0.39 to 0.78	<.01	8.69%
Pastor and Reuben (2005)[f]	14849	0.06	0.08	−0.22	0.08	0.80	0.69 to 0.94	<.01	44.18%
Stevens et al. (2005)[g]	18708[h]	0.02	0.05	−0.92	0.12	0.40	0.32 to 0.49	<.001	23.87%
Pooled totals	50292	0.05	0.07	−0.37	0.11	0.66	0.60 to 0.73	<.001	100

Notes:

*Comparative analysis with OR as association measure; fixed effect model; inverse variance as weighting method was used.

[a]Diagnoses based on combined parent and child report on the Child and Adolescent Psychiatric Assessment (CAPA) structured interview.

[b]Prevalence of DSM-IV ADHD any type

[c]Diagnoses based on whether a doctor or psychologist ever told the parent that their child has ADD, ADHD, or hyperactivity.

[d]Prevalence of parent reported ADHD diagnosis (total *N* only includes African Americans & Caucasian Americans in sample).

[e]Diagnoses are ICD-9-CM codes obtained from computerized administrative medical claims data.

[f]Diagnoses based on whether a doctor or health professional ever told the parent that their child had ADHD or ADD.

[g]Diagnoses based on parent report of ADHD as a medical condition of the child.

[h]Total *N* only includes African Americans and Caucasian Americans in the sample.