

DIAGNOSTIC VALIDITY OF DSM SYMPTOMS AND CRITERIA FOR PRESCHOOLERS:
DISRUPTIVE BEHAVIOR AND ATTENTION DEFICIT HYPERACTIVITY DISORDER
SYMPTOMS

By

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In loving memory of my mother, Paula Joyce Chase. Her strength is my inspiration, her wisdom a source of guidance, and her love a constant support.

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Abstract of Dissertation Presented to the Graduate School
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Attention Deficit Hyperactivity Disorder (ADHD) and the disruptive behavior disorders of Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) represent the most common child psychological disorders diagnosed today, and are increasingly being diagnosed in preschool-aged children. Developmental theory suggests that the criteria outlined in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) may be inappropriate for younger children, but very little research has examined the validity of these diagnostic categories and assessment measures for this age group. This study therefore explored the validity of current diagnostic standards and assessment measures of ADHD, ODD, and CD specifically in preschool-aged children. The sample consisted of 207 children aged three to six years referred for treatment of symptoms of ADHD and disruptive behavior. Confirmatory factor analysis was used to compare three possible symptom models of these diagnoses: (a) a four-factor model of ADHD-Inattentive, ADHD-Hyperactive, ODD, and CD currently implied by the DSM-IV; (b) a three-factor model that combined ADHD symptoms into one single factor, but included separate constructs of ODD and CD; and (c) a three-factor model allowing for separate ADHD-Inattentive and ADHD-Hyperactive factors but collapsed symptoms of ODD and CD

into one disruptive behavior construct. Findings supported the four-factor model represented by the DSM-IV, which provided superior fit for the data as compared to both of the less differentiated models. The study also further explored current assessment strategies with this age group. We assessed and compared the validity of the fourth edition of the Diagnostic Interview Schedule for Children (DISC-IV), the Young Child Version of the Diagnostic Interview Schedule for Children (YC-DISC), and the fourth edition of the Early Childhood Inventory (ECI-4). All measures demonstrated similar correlations with other measures of child behavior, suggesting comparable validity across measures for this age group. Overall, results support the use of DSM-IV diagnostic categories with preschool-aged children and add to the limited research on the validity of current assessment methods for young children. These findings help promote accurate identification and subsequent treatment of psychopathology in preschoolers.

CHAPTER 1 INTRODUCTION

The American Psychiatric Association (APA) introduced its first catalogue of mental disorders in 1952, largely in response to the increased prevalence and awareness of mental disturbance following World War II (Silk et al., 2000). The original version of the Diagnostic and Statistical Manual of Mental Disorders (DSM-I; APA, 1952) made no distinction between child and adult disorders. A child could be given any adult diagnosis, with little consideration to any developmental differences in classification or expression of a disorder (Silk et al., 2000). The second edition of the DSM (DSM-II; APA, 1968) introduced a section entitled “Behavior Disorders of Childhood and Adolescence,” which included such diagnoses as “hyperkinetic reaction of childhood” and “overanxious reaction of childhood.” DSM-II therefore began to consider the differences in the expression of psychopathology in children and adolescents as compared to adults. However, the DSM-II emphasized that these categories should be used only when no other classification was possible, as this nascent childhood disturbance most likely represented a developing adult disorder. The nosology of DSM-II reflected the widespread belief that psychopathology in adulthood could always be traced back to childhood and adolescence, and child mental illness could be conceptualized as a slowly emerging disorder that would be fully realized in adulthood (Silk et al., 2000). Thus, although the DSM-II recognized that the developing child may differ from the adult in the symptomatic expression of psychological disturbance, its theoretical framework suggested that the disorder was always present in the same form, but may not have fully revealed itself in a young child.

The third edition of the DSM (DSM-III; APA, 1980) underwent major revisions in diagnostic method and overall approach to classifying psychopathology. For the first time, the DSM-III included detailed descriptions of mental disorders and specific criteria for each

category. The DSM-III rejected the psychoanalytic framework underlying its previous edition and instead based diagnoses on empirically derived categories. The DSM-III also stipulated that a “disorder” is characterized by functional impairment and subjective distress from the patient. The multiaxial system was first introduced in the DSM-III, which required clinicians to assess developmental disorders, personality disorders, medical conditions, and global functioning. The DSM-III also provided information on clinical presentation of disorders, such as age of onset and gender differences (APA, 1980). Inclusion of these factors demonstrated some acknowledgement of the role of context and environment in the expression of psychopathology.

The number of specific childhood disorders significantly increased from the second to the third edition of the DSM (Bemporad & Schwab, 1986). The DSM-II section of Behavior Disorders of Childhood and Adolescence included short and somewhat vague descriptions of a range of child problem behaviors, including “runaway reaction of childhood or adolescence” and “unsocialized aggressive reaction of childhood or adolescence” (DSM-II; APA, 1968). The DSM-III introduced the specific disruptive behavior disorders of Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). ODD is characterized by a pattern of child noncompliance and disrespect for adult authority, while CD is characterized by a repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated (APA, 1980). The DSM-III also further developed the DSM-II diagnosis of “hyperkinetic reaction of childhood” and introduced the diagnosis of Attention Deficit Disorder (ADD), which was viewed primarily as a disorder of inattention and could be diagnosed with or without hyperactivity. The refinement of childhood disorders continued with the revised version of the DSM-III, which included age-appropriate modifications to several symptoms in an attempt to increase their developmental sensitivity (DSM-III-R; APA, 1987). Importantly, the DSM-III-

R was the first version to use research from DSM field trials to clarify and validate diagnoses, and results from these trials were used to inform and refine diagnostic criteria for several child disorders, including the former ADD category now classified as Attention Deficit Hyperactivity Disorder (ADHD; DSM-III-R; APA, 1987).

The fourth edition of the DSM (DSM-IV; APA, 1994) continued to develop childhood diagnoses and expand subtypes of certain child disorders. DSM-IV criteria for ODD require that children meet four out of eight possible symptoms, such as: arguing with adults, actively defying or refusing to comply with adults' requests or rules, and deliberately annoying others. CD criteria have changed somewhat since the disorder's first appearance in the DSM-III, although the core feature, involving blatant and persistent disregard for others or societal rules, has remained the same. Current criteria necessitate three or more behaviors relating to aggression, destruction of property, deceitfulness or theft, and major violations of societal norms or rules. The text of the DSM-IV states that a diagnosis of CD should reflect internal psychological dysfunction and not a reaction to a negative environment. However, this qualification is not included in DSM-IV diagnostic criteria, leading some to question the clinical utility of this text comment (Wakefield, Pottick, & Kirk, 2002).

The DSM-IV also revised the diagnostic categories related to ADHD, which now consist of three subtypes: predominantly inattentive, predominantly hyperactive, and combined type. Children must meet six of nine possible inattentive symptoms, such as difficulty sustaining attention and organizing tasks and activities, or six of nine hyperactivity/impulsivity symptoms, such as fidgeting or squirming and interrupting or intruding on others. To warrant a diagnosis of ODD or ADHD, symptoms must have persisted for at least 6 months; in the case of CD, three or more criterion symptoms must have been present within the last twelve months, with at least one

present in the previous six months. As with all DSM-IV categories, the symptoms must cause significant impairment in everyday functioning to indicate a true disorder (DSM-IV; APA, 1994).

ADHD and the Disruptive Behavior Disorders

ADHD and the disruptive behavior disorders, ODD and CD, are the most common childhood disorders diagnosed today. ODD and CD are estimated to occur in 2 to 16% of school-age children, depending on the population sampled and the method of assessment (Loeber et al., 2000). ODD prevalence tends to be highest in younger samples whereas the more severe behaviors inherent in the diagnosis of CD become more prevalent at older ages. Additionally, the CD diagnosis supersedes that of ODD if symptoms of both disorders are present; thus, the two disorders are viewed on a spectrum of severity. ADHD is diagnosed in 1 to 5% of school-aged children (APA, 1994) and 2% of preschool-aged children (Lavigne et al., 1998), although community studies based on teacher report have included estimates as high as 16% (Nolan, Gadow, & Sprafkin, 2001). ODD/CD and ADHD are linked with a myriad of detrimental effects on a variety of psychosocial outcomes and are associated with higher levels of parenting stress (Baker & Heller, 1996; DuPaul et al., 2001), greater social impairment (DuPaul et al., 2001; Greene et al., 2002; Wilens et al., 2002), and increased risk for emotional problems (Thomas & Guskin, 2001) when compared to controls. The disruptive behavior disorders and ADHD are generally recognized as common childhood disorders that warrant early identification and treatment (Abikoff & Klein, 1992; Ross, et al., 1998).

Complicating the clinical presentation of these common childhood disorders is the high rate of overlap among them. As noted above, ODD and CD reflect similar patterns of negativistic, defiant, and hostile behaviors, and CD is conceptualized as a more severe form of ODD. In fact, some researchers have proposed the elimination of CD from the DSM, as

diagnostic criteria include a wide range of heterogeneous behaviors that generally reflect deviant and defiant behaviors; Huffine (2002) argues that the diagnosis of CD has little clinical utility and does not relate to any specific treatment program beyond those typically used to target symptoms of ODD. Additionally, high rates of comorbid ODD/CD and ADHD are well documented, particularly in school-aged samples, with estimates of co-occurrence ranging from 30 to 62% (Newcorn et al., 2001; Wilens et al., 2002). These findings call into question the uniqueness of these disorders and have led to the proposal of an ODD/CD subtype of ADHD (Nottelmann & Jensen, 1995; Christiansen et al., 2008).

Validity of the DSM-IV Nosology

Comorbidity in child psychopathology is common, with estimates as high as 75% (Nottelmann & Jensen, 1995). One explanation for the high rates of comorbidity relates to the idea that comorbid disorders could result from conceptual flaws in our current diagnostic system. That is, comorbidity may reflect a methodological artifact: a failure of the DSM to represent properly the constructs underlying psychological disorders. The high rates of comorbidity might suggest that a more parsimonious nosology would be more accurate than that currently implied by the DSM (Lilienfeld, Waldman, & Israel, 1994; Krueger, Caspi, Moffitt, & Silva, 1998). This argument is particularly salient when discussing child psychological disorders. It has been proposed that due to their developmental level, children vulnerable to psychological problems are more likely to demonstrate a range of psychological symptoms that cut across different diagnostic categories (Nottelmann & Jensen, 1995). Indeed, the differentiation of child psychological disorders is often difficult to establish; research involving the internalizing disorders suggests that anxiety and depressive symptoms are frequently undifferentiated in young children (Cole, Truglio, & Peeke, 1997). It has been argued that specific psychopathology dimensions evolve with development (Craighead, 1991) and that a more general framework of

“externalizing” and “internalizing” disorders may be more relevant in diagnosing young children (Nottelmann & Jensen, 1995).

The differentiation of DSM-IV disorders in child and adolescent samples has become an increasing area of interest within the literature. Studies of this nature generally involve subjecting DSM symptoms to confirmatory factor analysis to determine whether the underlying factor structure implied by the DSM-IV provides the best fit for the data or whether a more parsimonious model is more appropriate (Sterba, Egger, & Angold, 2007). In summarizing the current literature on DSM syndrome differentiation, Lahey and colleagues (2004) conclude that many areas of psychopathology are well-represented by the constructs implied by DSM-IV criteria. However, results are more ambiguous in differentiating between Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) and between the two types of ADHD (Lahey et al., 2004).

Several factor analytic studies support separate inattentive and hyperactive-impulsive factors within the constellation of ADHD symptoms (Lahey et al., 2008; Glutting, Youngstrom, & Watkins, 2005; Willoughby, Curran, Costello, & Angold, 2000). However, some research suggests a unidimensional ADHD factor, particularly for younger children. One study found that a unifactorial model of ADHD was most appropriate for 4 -5 year-old children, whereas a bifactorial model was the best fit for 6 – 7 year-old children (Bauermeister, 1992).

Differentiation between ODD and CD has also been difficult to establish, primarily because of the low occurrence of CD symptoms in both child and adolescent samples. Some studies have combined ODD and CD symptoms and focused on its differentiation from ADHD (Pillow, Pelham, Hoza, Molina, & Stultz, 1998), while others simply exclude CD symptoms because of their low frequency and focus only on the differentiation between ODD and ADHD

(Burns, Boe, Walsh, Sommers-Flanagan, & Teegarden, 2001). When CD symptoms are allowed to map onto their own latent construct, however, evidence supports its differentiation from ODD (Lahey et al., 2008; Burns et al. 1997). Lahey and colleagues (2008) directly compared the DSM-IV model, with separate ODD and CD factors, with a combined ODD/CD model inherent in the International Classification of Diseases (ICD-10; World Health Organization, 1993) and found support for separate ODD and CD factors.

Notably, the majority of research validating the DSM structure of psychopathology involves school-aged children and adolescents. To date, only three studies have employed confirmatory factor analysis to validate DSM-IV disorders in preschool populations. Two of these studies focused on anxiety disorders and found support for separate constructs of separation anxiety, social anxiety, obsessive compulsive disorder, specific phobias, and generalized anxiety disorder (Eley et al., 2003; Spence, Rapee, McDonald, & Ingram, 2001). A recent study by Sterba, Egger, & Angold (2007) sought to confirm DSM categories across both internalizing and externalizing disorders in a sample of 307 2- to 5-year-olds recruited from a primary care clinic. DSM-IV symptoms of ADHD, ODD, and CD, as well as social phobia, separation anxiety, and generalized anxiety disorder were assessed with the Preschool Age Psychiatric Assessment (PAPA). Separate confirmatory models were run for the internalizing versus externalizing disorders. Within the disruptive behavior disorder models, a 4-factor model of ADHD-Inattentive ADHD-Hyperactive, ODD, and CD was compared with two 3-factor models, one of which collapsed inattentive and hyperactive symptoms into a single ADHD factor, while the other combined ODD and CD symptoms. Results supported the three-factor model that included separate ADHD-Inattentive and ADHD-Hyperactive factors but combined ODD and CD symptoms into one factor. The authors concluded that an undifferentiated

ODD/CD construct seems most relevant to preschoolers. However, further research examining CD symptoms in preschoolers is necessary given the conflicting results surrounding the validity of separate ODD and CD factors within child populations (Sterba, Egger, & Angold, 2007; Burns et al., 1997). Indeed, further research specifically examining CD symptoms in clinical preschool populations seems warranted. The disruptive behavior disorders and ADHD are increasingly being diagnosed in preschool populations, highlighting the need for further assessment of the validity of these disorders in this age group.

Issues in Preschool Diagnosis

Diagnosing psychopathology in preschool aged children raises important questions regarding developmental considerations for this population. As discussed above, it was only recently that the DSM began to consider differences between children and adults, and the current diagnostic system reflected by the DSM-IV provides few modifications for very young children. These may be important issues, as the rapid development characterizing early childhood makes it difficult to assure that maladaptive symptoms are a sign of true psychopathology and not a variation of normal child development. Additionally, the DSM provides little information on the normative development of young children to guide diagnostic decisions in this age group (Eyberg, Schuhmann, & Rey, 1998; Egger & Angold, 2004).

These issues in preschool diagnosis are particularly relevant in the diagnoses of ODD, CD, and ADHD. Due to their cognitive and social development, and the struggle for independence from their parents that commonly occurs in the second or third year, some level of aggression and noncompliance is expected in preschool-aged children (Campbell, 2002). Thus, a certain level of disruptive behavior symptoms may be present as part of normal child development. Similarly, all preschool children are expected to display some level of inattention and hyperactivity. A young child may have difficulty sitting still and sustaining attention, and

generally demonstrate certain ADHD behaviors as part of their natural development. Consequently, the boundaries between normative and pathological may be particularly challenging to establish when assessing for ODD, CD, or ADHD in young children. The diagnosis of CD in preschoolers is particularly controversial, and the validity of this diagnosis in very young children has been hotly debated (McClellan & Speltz, 2003; Wilens et al., 2003). One study followed a sample of 92 preschoolers diagnosed with ODD over two years and found very low rates of the CD diagnosis over time (Speltz, McClellan, DeKlyen, & Jones, 1999). The authors argued that most CD criteria are irrelevant to preschoolers due to their developmental level and typical environment. In contrast, however, several studies have found support for the diagnosis in clinical populations, with estimates ranging from 22 to 40% (Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998; Keenan & Wakschlag, 2000; Wilens et al., 2002).

Research does support the validity of these disorders in very early childhood in regards to distress and interference in daily functioning. Preschoolers diagnosed with disruptive behavior disorders demonstrate clinically significant levels of aggression, noncompliance, and destructive behavior that lead to impairments in social, academic, and family functioning (Keenan & Wakschlag, 2000; Keenan & Wakschlag, 2002). Similarly, preschoolers diagnosed with ADHD demonstrate significant social and academic impairment relative to controls (Lahey et al., 1998), and ADHD preschoolers display similar impairments in functioning when compared to their school-aged counterparts (Wilens et al., 2002). Therefore, evidence supports the validity of ODD/CD and ADHD in preschoolers, but questions remain regarding the applicability of the current diagnostic standards to younger populations. Research is needed to determine whether younger children are accurately classified according to the categories included in the DSM-IV.

Further study in this area is crucial to promote effective assessment and subsequent treatment in this age group.

Current Assessment Strategies

Along with further efforts to validate ADHD and the disruptive behavior disorders in young children is the need to improve our assessment of these diagnoses in the preschool population. Relatively few measures have been specifically developed for preschoolers; more commonly, assessment methods developed for older children are applied to younger children. One important direction therefore includes further study of the validity and reliability of commonly used assessment instruments for preschoolers. The *Diagnostic Interview Schedule for Children* (DISC-IV; Shaffer et al., 2000) is a structured diagnostic interview of child psychopathology based on DSM-IV criteria. The DISC-IV is a highly structured diagnostic interview that is commonly used to assess psychopathology in children, particularly in research studies. A parent version (DISC-IV-P) exists for parents or caregivers of 6- to 17-year-olds, and a child self-report (DISC-IV-C) is used for 9-to 17-year-olds. Some research studies have used the DISC-P with parents of children as young as 4 (Speltz, McClellan, DeKlyen, & Jones, 1999), but most research on this instrument involves older children and adolescents. A recent modification of the DISC-IV was designed to increase its developmental sensitivity for preschoolers (Young Child Version of the Diagnostic Interview Schedule for Children; (YC-DISC; Lucas, Fisher, & Luby, 2000). The YC-DISC differs from the DISC-IV by modifying the language of symptoms to be more appropriate for young children. The interview also modified the time frame for each symptom. In the DISC-IV, parents are asked whether a symptom has been present for the past month and then for the past year. The YC-DISC asks only whether a symptom has been present for the past three months. This newly developed instrument has yet to be studied empirically to determine its validity in this age group.

The Early Childhood Inventory, fourth edition (ECI-4) is a parent behavior rating scale that screens for DSM-IV emotional and behavioral disorders and is specifically designed for children between 3 and 6 years old (Gadow & Sprafkin, 2000). Parents are asked to rate the frequency of specific behaviors that map onto DSM criteria for common child diagnoses. However, certain symptoms deemed developmentally irrelevant are excluded, such as the truancy item from the CD module. Additionally, the wording of certain items is altered to increase their developmental sensitivity. The ECI-4 may be scored according to either the categorical or dimensional approach.

Structured and semi-structured interviews based on DSM criteria represent the categorical approach to diagnosis in which a disorder is rated as either present or absent. Behavior rating scales, in which a child's behavior is rated along a continuum and then compared to a normative sample, represent the dimensional approach. Both approaches include their own strengths and weaknesses. Categorical approaches have been criticized for poor specificity; some research suggests high false-positive rates across diagnostic categories. Categorical approaches have also been criticized for failing to account for overlapping symptoms, subsequently inflating rates of comorbidity (Achenbach, 1995). Dimensional scales are not without their own weaknesses, and have been criticized for poor sensitivity and for failing to provide important information regarding onset, duration, and severity of symptoms. Although the relative superiority of these two approaches has been a popular area of debate, research does not clearly support one method over the other. Jensen and colleagues (1996) directly compared these two approaches and found little difference between them. Both the dimensional approach (i.e., Child Behavior Checklist; CBCL) and the categorical approach (i.e., DISC, Version 2.1) demonstrated low to moderate correlations with a variety of external validators, such as school impairment, service utilization,

and psychosocial and developmental risk factors. The authors concluded that, rather than debating the superior assessment technique, efforts should instead be directed towards validating diagnostic categories, because neither the categorical nor dimensional approach exhibited particularly strong relations with the external validators (Jensen et al., 1996). Currently, the “gold standard” of diagnosis involves a combination of categorical and dimensional approaches.

The Eyberg Child Behavior Inventory (ECBI) is a widely used parent rating scale measuring disruptive behavior disorders in children ages 2 to 16 (Eyberg & Pincus, 1999). The validity and reliability of this measure is well-established (Boggs, Eyberg, & Reynolds, 1990; Funderburk, Eyberg, Rich, & Behar, 2003). The ECBI has also been correlated with diagnostic interview ratings specifically in a preschool sample (Doctoroff & Arnold, 2004). The ECBI was originally designed as a unidimensional measure of disruptive behavior (Eyberg & Robinson, 1983), and some studies confirm that a one-factor model provides the best fit for the structure of the ECBI (Eyberg, 1992; Colvin, Eyberg, & Adams, 1999; Gross et al., 2007). However, other researchers have found evidence for three separate factors within the ECBI representing oppositional defiant behavior, conduct problems, and attention difficulties (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). If a three factor structure is valid, then component scores may be useful in screening for the specific disorders. However, current data are mixed, and more research is warranted before these three factors are used as separate diagnostic indicators. Notably, the two recent studies that examined the factor structure of the ECBI specifically in preschool samples found conflicting results. In their predominantly Caucasian sample of 2 to 6-year-old children, Weis, Lovejoy, & Lundahl (2005) found support for the three-factor structure, whereas a more ethnically diverse sample of 2 to 4-year-olds resulted in a one factor model (Gross et al., 2007). Both of these studies involved community,

rather than clinical, samples. Future research examining the underlying factor structure of the ECBI therefore should focus on clinic-referred preschool populations.

Developmental Modifications to Current DSM Standards

The field is increasing its focus on the expression of psychological disorders in preschoolers. Along with recognition that certain behaviors listed in the DSM are, in fact, found in normally developing children, comes the realization that a more appropriate approach to diagnosis in children may involve developmentally modified criteria. Some researchers argue that criteria should be less stringent for younger children because it would be unrealistic for young children to demonstrate stable patterns of problem behaviors (Luby et al., 2002); others argue for more stringent criteria, given that fleeting problem behaviors can characterize normal development (Wakschlag, Leventhal, & Thomas, in press). Limited research has systematically explored developmental modifications to DSM criteria, yet this research is increasingly recognized as an important future direction to improve the developmental sensitivity of current diagnostic tools (Wakschlag, Leventhal, & Thomas, in press; Egger & Angold, 2004; Eyberg, Schuhmann, & Rey, 1998).

One mechanism that may increase developmental sensitivity involves the use of age-graded criteria. According to the DSM-IV, a six-year-old and a fourteen-year-old must demonstrate the same number of symptoms to warrant a diagnosis of ADHD. This standard seems somewhat counterintuitive given that the six-year-old will naturally be more active and less attentive than the fourteen-year-old. The young child is therefore more likely to receive the diagnosis, even if the adolescent deviates more severely from age-appropriate behaviors (Silk et al., 2000). The concept of age-graded criteria is particularly relevant in diagnosing preschool ADHD; the high rates of ADHD-like behaviors in typically developing children has led to the recommendation of longer symptom duration for very young children (Barkley, 2006). Thus, the

field is beginning to consider the possibility of different criteria for various developmental levels. Although the DSM-IV advises its users to consider what is “developmentally appropriate” for a child of a certain age, this is a vague recommendation, and it is unclear how much credence clinicians give to this warning. A more formal age-graded system based on developmental norms would concretize the importance of the child’s developmental level in assigning diagnoses. This concept is included in the Diagnostic and Statistical Manual for Primary Care (DSM-PC; Wolraich, Felice, & Drotar, 1996), developed to facilitate the identification of psychological disorders in the primary care setting. The framework of the DSM-PC reflects the idea that psychopathology occurs along a spectrum: the clinician can classify problematic child behaviors as developmental variations, problems, and disorders, with each category denoting an increasing level of problem severity. The category of “developmental variation” allows the clinician to recognize that a child behavior viewed as problematic to the caregiver may reflect a normative variation of child development. “Problems” include those behaviors that may be distressing or causing some impairment in the child’s overall functioning but do not warrant a formal DSM-IV diagnoses. The final category of “disorders” reflects those categorized in the DSM-IV. The DSM-PC also includes concrete examples of developmental variations, problems, and disorders across different age groups. Thus, the DSM-PC recognizes that psychopathology occurs along a continuum, and that the level at which a behavior is reflective of psychopathology is influenced by child age (Wolraich, Felice, & Drotar, 1996).

Research Questions

This study was designed to examine the validity of DSM-IV symptoms for ODD, CD, and ADHD in preschoolers and explore the validity of current diagnostic assessment measures for this age group. The study also examined relations between DSM symptoms, symptom severity,

and child age, to serve as a preliminary examination of age-graded criteria for the disruptive behavior disorders and ADHD.

The first aim of this study was to examine the validity of the DSM constructs of ODD, CD, and ADHD in a clinical preschool sample. Specifically, we focused on the differentiation between the different subtypes of ADHD, as well as separate factors of ODD and CD. The majority of previous research supports two separate factors relating to the inattentive and hyperactive domains within ADHD, even within a preschool sample. Additionally, a recent study found support for collapsing ODD and CD symptoms into one single construct of disruptive behavior. We therefore hypothesized that a three-factor model, with constructs representing ADHD-Inattentive, ADHD-Hyperactive, and ODD/CD would provide the best fit in a sample of clinic-referred preschoolers.

The second specific aim further examined current assessment techniques with a preschool sample. We compared the validity of three measures commonly used to assign DSM-IV symptoms and diagnoses. Specifically, symptom counts from the Diagnostic Interview Schedule for Children (DISC-IV; Schaffer et al., 2000), the Young-Child version of the DISC (YC-DISC; Lucas, Fisher, & Luby, 2000), and the Early Childhood Inventory (ECI-4; Gadow & Sprafkin, 2000) were correlated with other measures of child disruptive behavior, including the Attention Problems and Aggressive Behavior subscales from the Child Behavior Checklist (CBCL) and the ECBI. We hypothesized that the three assessment methods would demonstrate similar correlations with other measures of child behavior, suggesting similar validity across diagnostic interview type. To examine further a commonly used dimensional measure of disruptive behavior in preschoolers, we conducted a confirmatory factor analysis of the ECBI to determine whether a three factor model which maps onto the three externalizing behavior diagnoses can be

confirmed in a diverse clinical sample of preschoolers. In light of the range of literature that supports a three-factor model of the ECBI, we hypothesized that the three factors would provide good fit in a diverse sample of clinic-referred preschoolers.

The final set of specific aims was related to the idea that children of different ages may vary in the number of symptoms required to warrant a clinical diagnosis. Specifically, we examined whether number of symptoms would be a significant predictor of severity on the relevant subscale of the CBCL and whether age would moderate that relationship. We hypothesized that number of ADHD symptoms would predict attention problem scores on the CBCL and that age would moderate the relationship such that the positive relationship between ADHD symptom count and attention problems would be stronger for older children. We also hypothesized that number of ODD symptoms would predict scores on the externalizing subscale of the CBCL and that age would moderate the relationship such that the relationship between ODD symptom count and externalizing behavior would be stronger for older children. Finally, we hypothesized that number of CD symptoms would predict scores on the aggressive behavior subscale of the CBCL and that age would moderate the relationship such that the relationship between CD symptom count and aggressive behavior would be stronger for older children.

CHAPTER 2 METHODS

Participants

Participants were 207 children between the ages of 3 and 6, inclusive, who received a diagnosis of ADHD, ODD, CD, or a combination of ADHD and ODD/CD. To increase sample size and to allow adequate power for the type of statistical analyses proposed, participants were drawn from several studies, each of which is described below. All children were involved in research on the effectiveness of Parent-Child Interaction Therapy (PCIT). Exclusion criteria included immediate crisis requiring hospitalization or out-of-home placement.

Project GIFT

A subset of participants was drawn from a study of PCIT and the maintenance of treatment gains (Project GIFT). One hundred boys and girls between the ages of 3 and 6 were enrolled in the study after being referred to a university psychology outpatient clinic for treatment of behavior problems; data were available from 99 of the original 100 participants. Families were referred for treatment by pediatricians, teachers, other mental health providers, or were self-referred. Inclusion criteria for Project GIFT stated that the child must meet DSM-IV diagnostic criteria for the diagnosis of ODD and must live with at least one parent able to participate in treatment. Children were excluded from the study if they scored below a standard score of 70 or if their parent scored below a standard score of 75 on cognitive screening measures, if they had a major sensory impairment such as blindness, or if they had been diagnosed with a pervasive developmental disorder. Children who were taking psychotropic medication were required to be stabilized on this medication for at least one month prior to entering the study.

Project GANA

Another subset of participants was drawn from a study of the efficacy of PCIT with Mexican American families (Project GANA). Participants were 58 Mexican American families of 3- to 7-year-old children with clinically significant behavior problems seen for treatment at a community mental health clinic; the three 7-year-old children were dropped from the current study, leaving data from 55 participants. Families were referred from schools/teachers, hospitals or other clinics, social workers, or were self-referred. Families were eligible if they met the following criteria: (1) Parent identified the child as a Mexican American child between the ages of 3 and 7, (2) Child received a score above the clinical cutpoint on the Intensity Scale of the Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999), and (3) Neither parent nor child were participating simultaneously in any other psychosocial treatment targeting the child's behavior problems.

Project SHAPE

The final group of participants was drawn from an ongoing study on the efficacy of PCIT in treating children with ADHD and comorbid ADHD + ODD (Project SHAPE). Data from 53 boys and girls between the ages of 4 and 6 were available for the current study. Families were referred for treatment by pediatricians, teachers, other mental health providers, or were self-referred. Inclusion criteria for Project SHAPE stated that the child must meet DSM-IV diagnostic criteria for the diagnosis of ADHD, either hyperactive/impulsive or combined type. Due to the need to establish the presence of ADHD symptoms across two or more settings (APA; 1994), children were required to attend preschool or daycare for some part of each week. They were also required to live with a female primary caregiver able to participate in treatment. Along with a diagnosis of ADHD, some of the children additionally met criteria for ODD. Children were excluded from the study if they scored below a standard score of 70 or if their parent scored

below a standard score of 75 on cognitive screening measures, if they had a major sensory or mental impairment such as blindness, or if they had been diagnosed with a pervasive developmental disorder. One of the specific aims of Project SHAPE involved the investigation of the effectiveness of psychosocial, rather than pharmacological, treatment of ADHD. Therefore, children using psychotropic medications were excluded from this particular study.

Measures

Demographic and Background questionnaire: Parent questionnaires were used to obtain descriptive information about the child and family including sex, age, race/ethnicity, occupation, education level, and medical history.

Eyberg Child Behavior Inventory: (ECBI; Eyberg & Pincus, 1999). The ECBI is a 36-item parent rating scale of disruptive behavior. The ECBI Intensity Scale measures the frequency with which disruptive behavior occurs on a likert scale from 1 to 7, and the Problem Scale asks whether the parent finds the behavior problematic for themselves on a yes-no scale. The Intensity and Problem Scales of the ECBI yield internal consistency coefficients of .95 and .93 (Colvin, Eyberg, & Adams, 1999), interrater (mother-father) reliability coefficients of .69 and .61 (Eisenstadt, McElreath, Eyberg, & McNeil, 1994), and test-retest reliability coefficients of .80 and .85 across 12 weeks and .75 and .75 across 10 months, respectively (Funderburk, Eyberg, Rich, and Behar, 2003). Studies documenting convergent, discriminant, and discriminative validity of the scales have been summarized in the test manual (Eyberg & Pincus, 1999). The alpha coefficient for the ECBI in this study was .89.

Child Behavior Checklist: (CBCL; Achenbach, 1991; Achenbach, 1992; Achenbach & Rescorla, 2000; Achenbach & Rescorla, 2001). The CBCL is a commonly used measure of child behavior. The CBCL has different forms according to child age and recently underwent a revision. Therefore, analysis involved four different versions of the CBCL. In Project GIFT,

parents of children aged 4 through 6 completed the CBCL/4-18, which consists of 118 behavior-problem items rated on a 3-point scale from (0) *not true*, to (2) *very true* or *often true*. The items have been factor analyzed into two broadband scales of internalizing and externalizing behavior problems, as well as narrow band scales assessing specific problem areas. Mean one-week test-retest reliability has been reported at .93 for the Externalizing scale, .91 for the Aggressive behaviors subscale, and .90 for the Attention Problems subscale (Achenbach, 1991). The CBCL/2-3, administered to parents of 3-year-old children in Project GIFT, is similar in format to the CBCL/4-18 but contains 99 items rated by the parent for frequency in the past 2 months on the 3-point scale. Test-retest reliability of the CBCL/2-3 has been reported at .90 for the externalizing scale and .91 for the Aggressive Behavior subscale over a three-week period (Koot et al., 1997). Notably, the CBCL/2-3 did not include an Attention Problems subscale.

Both age forms of the CBCL underwent a recent revision; parents in Projects GANA and SHAPE therefore completed the appropriate age form of the most recent version. The CBCL/6-18 (Achenbach & Rescorla, 2001) is a 120-item parent rating scale designed to measure the frequency of children's behavior or emotional problems on a 3-point scale from (0) *not true*, to (2) *very true* or *often true*. One-week test-retest reliabilities have been reported as .92 for the Externalizing Scale, .90 for the Aggressive behavior subscale, and .92 for the Attention Problems subscale (Achenbach & Rescorla, 2001). The CBCL/1.5-5 (Achenbach & Rescorla, 2000) is comprised of 99 items describing children's behavioral and emotional problems, which are rated by parents on a 3-point scale from (0) *not true*, to (2) *very true* or *often true*. One week test-retest reliabilities have been reported as .87 for the Externalizing scale, .87 for the Aggressive behavior subscale, and .78 for the Attention Problems subscale (Achenbach & Rescorla, 2000).

Diagnostic Interview Schedule for Children: (DISC-IV; Schaffer et al., 2000). The DISC-IV is a structured diagnostic interview of child psychopathology based on *Diagnostic and Statistical Manual of Mental Disorders* criteria (DSM-IV; American Psychiatric Association, 1994). Test-retest reliabilities have been reported at .54 for ODD, .54 for CD, and .79 for ADHD on this instrument (Schaffer et al., 2000). The DISC-IV-P was administered to the child's primary caregiver at pre-treatment by a trained graduate research assistant in Project GIFT.

Young-Child DISC. (Lucas, Fisher, & Luby, 2000). Project SHAPE involved the use of a recent adaptation of the DISC interview for young children; the Young-Child DISC (YC-DISC). The YC-DISC is highly similar to the DISC-IV in its format and administration. However, the language has been modified to increase its sensitivity, and the time frame for each symptom has been uniformly set at three months. The YC-DISC was administered to the child's primary caregiver at pre-treatment by a trained graduate research assistant in Project SHAPE.

Early Childhood Inventory: (ECI-4; Gadow & Sprafkin, 2000). The ECI-4 is a parent behavior rating scale that screens for DSM-IV emotional and behavioral disorders in children between 3 and 6 years old. Parents are asked to rate the frequency of specific behaviors on a 4-point scale from (0) never, (1) sometimes, (2) often, and (3) very often. Symptoms generally map onto DSM-IV criteria; however, four symptoms of CD are not included: breaking and entering, missing curfew, running away, and truancy. Additionally, the ECI-4 assesses for stealing behaviors only, with no distinction between with and without confrontation. Thus, the CD module on the ECI-4 includes 10 symptoms, compared to the 15 listed in the DSM-IV. The wording of certain symptoms is altered to increase developmental sensitivity; for example, the ECI-4 asks the parent to rate their preschoolers' preoccupation with sexual activity rather than the DSM symptom of forcing sexual activity. A recent study reported internal consistency

coefficients of .91 for ADHD-Inattentive, .90 for ADHD-Hyperactive, .93 for ODD, and .87 for CD. Study results also documented adequate convergent, discriminant, and discriminative validity of the ECI-4, particularly for the ADHD and ODD scales (Sprafkin, Volpe, Gadow, Nolan, & Kelly, 2002). According to the scoring guidelines in the ECI-4 manual, behaviors rated as often or very often were included in the symptom count for this study to help ensure that the behavior was truly reflective of a frequent and pervasive symptom (Gadow & Sprafkin 2000). The ECI-4 was completed by the child's primary caregiver at the pre-treatment assessment in Project GANA.

Procedures

Following the informed consent process, families in all studies completed a pre-treatment assessment that included completion of the demographic questionnaire, ECBI, and CBCL. The presence of ODD, CD, and ADHD symptoms was determined by the female primary caregiver's responses on the DISC-IV interview in Project GIFT and the YC-DISC interview in Project SHAPE. In Project GANA, the female primary caregiver completed the ECI-4 to assess child symptoms of ODD, CD, and ADHD. Table 2-1 provides an overview of the assessment measures across the three different studies.

To obtain access to data from all three datasets, the investigator first sought IRB approval through the University of Florida Health Science Center. After receiving IRB approval, all data were first de-identified and then transmitted through data-encrypted files.

Confirmatory Factor Analysis and Model Evaluation

This study examined the fit of the factor structure implied by the DSM-IV in a preschool population. We therefore employed confirmatory factor analysis (CFA) to test the current diagnostic system. A review of the literature provides support for the different disorders represented by the DSM-IV, particularly in school-aged and adolescent samples. However,

differentiation between the subtypes of ADHD and between the two disruptive behavior disorders, ODD and CD, has been more difficult to establish. We ran a series of three models: (a) The four-factor model inherent in the DSM-IV: ADHD-Inattentive, ADHD-Hyperactive, ODD, and CD; (b) A combined ADHD model that collapses symptoms across the inattentive and hyperactive domains to create three factors of ADHD, ODD, and CD, and (c) A disruptive behavior model that combines symptoms of ODD/CD into one factor, leaving three factors of: ADHD-Inattentive, ADHD-Hyperactive, and ODD/CD.

The observed indicators involved in this analysis are dichotomous and consequently violate assumptions of multivariate normality. Maximum likelihood estimation, commonly used in factor analysis, is therefore inappropriate in this study because it uses dichotomous indicators. Analyses were run using the Mplus program (version 4.2; Muthén & Muthén, 2006). The program addresses dichotomous variables through analysis of the tetrachoric correlation matrix, using Weighted Least Squares with Mean and Variance Adjustment (WLSMV) to adjust for non-normal data.

To evaluate the three models, we examined the absolute fit (chi-square statistic), relative fit indices (Comparative Fit Index, CFI; Tucker-Lewis Index, TLI), the Root Mean Square Error of Approximation (RMSEA), which estimates discrepancy between model-implied and population covariance matrices, and the Weighted Root Mean Squared Residual (WRMR). Traditional guidelines for establishing good fit have been criticized as somewhat arbitrary (Marsh & Hau, 1996). Yu and Muthén (2002) evaluated fit indices with different types of data (i.e., continuous, nonnormal continuous, and dichotomous) in small, moderate, and large sample sizes to determine the cutoff values that would minimize both Type I and Type II errors. For dichotomous indicators and $N \geq 250$, their results indicated that least error would occur using the

following guidelines: CFI \geq .95, TLI \geq .95, RMSEA \leq .06, and WRMR \leq 1.0 (Yu & Muthén, 2002). The fit indices of each of the three models were held to these guidelines. Additionally, adjusted χ^2 difference tests allowed direct comparison of the models. Specifically, the DSM-IV model was compared to the combined ADHD model. The better-fitting of these two was then compared to the disruptive behavior disorder model. A significant difference in the χ^2 suggested that the more differentiated model fit the data better than the less differentiated (Sterba, Egger, & Angold, 2007).

Table 2-1. Overview of relevant measures across datasets

	Project GIFT (<i>N</i> = 99)	Project SHAPE (<i>N</i> = 53)	Project GANA (<i>N</i> = 55)
Measure of DSM-IV Symptoms			
DISC-IV-P	X		
YC-DISC		X	
ECI-4			X
CBCL			
CBCL/2-3 and CBCL/4-18	X		
CBCL/1.5-5 and CBCL/6-18		X	X
ECBI	X	X	X
Demographic Questionnaire	X	X	X

Note. All measures are from the pre-treatment assessment.

CHAPTER 3 RESULTS

Participant Characteristics

The 207 families who participated in the study included 147 boys (71%) and 60 girls (29%) with a mean age of 4.48 years ($SD = 1.01$). Fifty six percent of children were Caucasian (by parent report); 25% Hispanic, 7% African-American, 0.5% Asian, 0.5% Native American, 6% biracial, and 4% identified as “Other.” Mean yearly income for the entire sample was \$36,278.83 ($SD = \$29,779.31$); however, income varied significantly across the three studies. Families enrolled in Project SHAPE reported significantly higher income than families in both GIFT ($t(142) = 3.68, p < .001$) and GANA ($t(105) = 5.60, p < .001$). Additionally, families in Project GIFT reported higher income than families in Project GANA ($t(145) = 3.18, p < .001$). Full information on participants is presented in Table 3.1.

The clinical presentation of these three groups was also compared. Specifically, a between factor MANOVA was conducted with three dependent variables: CBCL externalizing score, CBCL internalizing score, and the ECBI intensity score. The GIFT sample was significantly larger than the other two groups. Multicollinearity among the three dependent variables (CBCL Externalizing score, CBCL Internalizing score, and the ECBI intensity score) was examined and was within acceptable limits.

The Box-M test for the homogeneity of variance-covariance matrices produced a significant result, $F(12, 78260.34) = 5.33, p < .01$. However, Levene’s test for the Externalizing score was the only significant result, $F(2, 190) = 6.32, p < .01$. Due to this violation of the assumption of homogeneity of variance, the relatively conservative Pillai’s trace was used in the following MANOVA.

The overall MANOVA revealed a significant main effect for study source, $F(6, 378) = 10.94, p < .01, \eta^2 = .148$. To further understand the model, univariate ANOVAs were conducted for each dependent variable. The main effect of study source was significant for Externalizing score, $F(2, 190) = 7.32, p < .01, \eta^2 = .071$, and ECBI intensity score, $F(2, 190) = 13.65, p < .001, \eta^2 = .126$. However, the three groups did not differ in Internalizing scores, $F(2, 190) = 1.32, p = .271$. Post hoc tests with Bonferroni correction were conducted to decompose further the significant main effect of study source. Children enrolled in GIFT demonstrated higher Externalizing scores than GANA participants ($p < .01$), but GIFT and SHAPE participants did not differ in their Externalizing scores ($p = .06$). Additionally, GANA participants demonstrated higher ECBI scores than both GIFT ($p < .01$) and SHAPE ($p < .001$) participants. GIFT participants also exhibited higher ECBI scores as compared to SHAPE participants ($p < .05$).

Table 3-1 includes the means and standard deviations for the three studies on each of the three dependent variables. Overall, the results suggest some differences in the clinical presentation of participants across different studies. Children enrolled in GIFT demonstrated higher rates of externalizing behaviors than children in GANA. However, GANA participants demonstrated higher total ECBI scores than both the GANA and SHAPE participants. Thus, it seems that GANA children cannot uniformly be characterized as less severe in their clinical presentation and rates of overall disruptive behavior.

Symptom and Diagnostic Patterns

Participants were drawn from three different studies, and DSM symptoms were assessed with a different assessment measure in each study. Symptom frequencies and rates of diagnosis are therefore presented by assessment and study source (See Tables 3-2 and 3-3). Notably, six of the fifteen DSM symptoms for CD occurred between zero and two percent of families in the

entire sample. These items were: (a)forcing sexual activity, (b)fire-setting, (c)breaking and entering, (d)missing curfew, (e)running away, and (f)truancy. These six items were removed from further analysis. The ECI-4 does not include breaking and entering, missing curfew, running away, or truancy, and given the low frequency of these items when assessed in the DISC-IV and DISC-YC, their exclusion seems warranted. Additionally, the ECI-4 assesses stealing behaviors only, while the DISC-IV and DISC-YC adhere to DSM-IV criteria and differentiate between stealing with and without confrontation. As can be seen in Table 3-2, stealing with confrontation occurred at low frequencies in both the GIFT (5%) and SHAPE (2%) samples. Further analysis therefore used a “stealing composite” symptom which included stealing with and without confrontation.

Confirmatory Factor Analyses of DSM Symptoms

CFA was used to determine which of three models provided the best fit for the 35 DSM symptoms of ADHD, ODD, and CD. The first model, referred to as the DSM-IV model, included four separate factors representing ADHD-Inattentive, ADHD-Hyperactive, ODD, and CD. The second model, the combined ADHD model, collapsed the inattentive and hyperactive ADHD symptoms and subsequently resulted in three factors of ADHD, ODD, and CD. The disruptive behavior model also included three factors but combined ODD and CD symptoms, resulting in the constructs of ADHD-Inattentive, ADHD-Hyperactive, and ODD/CD.

Fit indices for each of three models were compared and are presented in Table 3-4. All three models resulted in a significant chi square; however, the ratio of the chi-square to the degrees of freedom did not exceed the cutoff value of 2 for any of the three models. Therefore, all three models provided an adequate fit for the data. However, as described above, the conservative cutoff scores recommended for binary indicators and a small sample size are: $CFI \geq .95$, $TLI \geq .95$, $WRMR \leq 1.0$, $RMSEA \leq .06$ (Yu & Muthén, 2002). Using these guidelines, the

DSM four-factor model provided better fit for the data than either the combined ADHD three-factor model or the disruptive behavior three-factor model. Chi square difference testing confirmed these results (Muthén & Muthén, 2005). Specifically, when the DSM model was compared to the combined ADHD model, the DSM model provided significantly better fit, $\chi^2 (2, N = 207) = 14.02, p < .001$). Similarly, when the DSM model was compared to the disruptive behavior model, the DSM model provided significantly better fit, $\chi^2 (2, N = 207) = 11.09, p < .001$). Thus, results fail to find support for collapsing the ADHD symptoms across inattentive and hyperactive domains or for combining ODD and CD symptoms in this clinical sample of preschoolers. Table 3-5 shows that the loadings of the individual items onto their factors were generally high; the path diagram is shown in Figure 1. The two ADHD factors were highly correlated, as were the ODD and CD factors. Correlations between the ADHD and ODD, as well as ADHD and CD, demonstrated a moderate relationship. Correlations among the six factors are included in Table 3-6.

The CFA results provide support for the four-factor structure currently implied with the DSM-IV. The modification indices provide further evaluation of model fit, as they provide the expected reduction in chi square if a parameter were freely estimated. Notably, no modification indices were above the minimum value of ten (Muthén & Muthén, 1998-2006).

Validity of the Three Assessment Methods

To provide some measure of validity of the three assessment measures included in this study, ADHD, ODD, and CD symptom counts from the DISC-IV, DISC-YC, and ECI-4 were correlated with the ECBI, CBCL Attention Problems and CBCL Aggressive Behavior subscales, as well as the broadband Externalizing scale from the CBCL (See Table 3-7). Examination of the correlation matrix revealed that symptom counts across different assessment methods correlated

most highly with their conceptual counterpart scale of the CBCL. Additionally, correlations across the three different assessment measures tended to be of similar magnitude.

Confirmatory Factor Analysis of the Eyberg Child Behavior Inventory

CFA was used to confirm the three-factor solution of the ECBI (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). Although previous studies have all reported factors reflecting oppositional behavior, conduct problems, and attention difficulties, there are some differences in previous results regarding which items load onto the factors. The current study will confirm the structure reported by Weis, Lovejoy, & Lundahl (2005) as theirs is the only study that found support for a three-factor model in a sample of preschoolers, and they sought to confirm the three-factor model previously supported in an older sample (Burns & Patterson, 2000). The factor structure described in their study was highly similar to those presented in other research supporting a three-factor model and required several ECBI items to be dropped from the analysis, leaving 22 items in the model.

The observed indicators involved in this analysis are ordinal data. Due to the clinical nature of the sample, ECBI items tended to be positively skewed. The MPlus program addresses ordinal variables through analysis of the polychoric correlation matrix; the current analysis also employed Weighted Least Squares with Mean and Variance Adjustment (WLSMV) to adjust for non-normal data.

Results suggested that the three-factor solution was a relatively poor fit for the data. The model resulted in a highly significant chi square and failed to meet the cut off scores proposed by Yu and Muthén (2002) for any of the fit indices (see Table 3-8 for fit indices and Table 3-9 for the factor structure). Examination of the modification indices suggested model improvement by allowing several items to load onto all three factors. Additionally, results suggested that several items from the oppositional behavior factor should be allowed to load onto the attention

difficulties factor. Overall, findings failed to provide strong evidence for a three-factor model, and the modification indices were extensive and difficult to justify conceptually. Thus, an exploratory factor analysis seemed the appropriate next step.

All 36 ECBI items were therefore subjected to an exploratory factor analysis (EFA). Because other researchers found support for a three-factor model, we examined a one, two, and three-factor EFA of the ECBI items. Results from all three of these analyses are included in the Appendix. MPlus provides RMSR values for EFA analyses; significant decreases with increasing number of factors suggest better fit of the more differentiated models. As can be seen in the Appendix, the decrease in the RMSR from the one to two-factor model was small, and the decrease from the RMSR from the two to three-factor was minimal. Perhaps more importantly, the two and three-factor models did not conceptually match the factors of oppositional behavior, attention difficulties, and conduct problems found in previous studies (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). Indeed, it was difficult to interpret the two- and three-factor models.

In the two factor model, the first factor included most of the items and seemed to reflect a more general disruptive behavior factor that included a range of oppositional and attention-seeking behaviors. The second factor resembled the conduct problems factor found in previous studies, reflecting overt aggression and provocation. This second factor was comprised of five items: (a) destroys toys and other objects, (b) teases or provokes other children, (c) verbally fights with sisters and brothers, (d) physically fights with sisters and brothers, and (e) steals. Thus, the two-factor EFA seemed to reflect a general disruptive behavior construct with a smaller factor of severe conduct problems and aggressive behaviors. The three-factor EFA was exceedingly difficult to understand conceptually. The first factor again included the majority of

the ECBI items, representing oppositional and attention-seeking behaviors. The only significant loadings onto the second factor demonstrated a negative relationship with the underlying construct. The third factor included five items seeming to reflect a lack of respect for rules, such as having poor table manners and refusing to do chores when asked. None of the items demonstrated particularly strong loadings onto the third factor.

The one-factor model was then subjected to CFA to examine the fit of the model. Items with factor loadings below .4 on the EFA were dropped from the analysis. This included many items that failed to demonstrate significant loadings onto any factors in previous studies, such as whining and having poor table manners. The CFA also excluded several items that have previously been included on the “conduct problems” factor in previous studies, as these items seemed to be reflective of a more severe behavior than most other ECBI items. Thus, 25 items were subjected to a one-factor CFA. All measures of model fit improved and the results suggested good fit according to the TLI. The CFI value was marginal according to the guidelines proposed by Yu and Muthén (2002), although comparable to the value reported in previous studies (Weis, Lovejoy, & Lundahl, 2005), and the WRMR was also marginal. However, the RMSEA continued to suggest poor fit (see Table 3-8). The factor structure of the one-factor CFA is presented in Table 3-10.

Exploration of Age-Graded Criteria

As a preliminary examination of the possibility of age-graded criteria, a series of hierarchical regressions were conducted in which scores on the corresponding scale of the CBCL were regressed upon total number of symptoms, child age, and an interaction between those two variables. To test the hypothesized moderator effects of age, we evaluated the significance of the change in R^2 after the addition of the interaction term.

The first model examined the predictive power of ADHD symptoms and child age in inattention scores. Specifically, scores from the attention scale of the CBCL were regressed upon total number of ADHD symptoms, child age, and an interaction term between ADHD symptoms and child age to test the hypothesis that age would moderate the relationship between ADHD symptom count and severity of inattention. Total number of ADHD symptoms was entered in the first block and acted as a significant predictor, $F(1, 169) = 81.28, p < .001, R^2 = .325$. Child age was entered into the model and did not add to the predictive power of the model, $R^2 \Delta = .001$, nor was the interaction term between number of symptoms and age significant, $R^2 \Delta = .001$. Thus, number of ADHD symptoms was a significant predictor of attention scores on the CBCL. However, the current analysis failed to support the hypothesis that age would moderate that relationship between symptom count and severity of inattention.

The second model examined the predictive power of ODD symptoms and child age in externalizing behavior scores. In this analysis, scores from the externalizing scale of the CBCL were regressed upon total number of ODD symptoms, child age, and an interaction term between ODD symptoms and child age to test the hypothesis that age would moderate the relationship between ODD symptom count and severity of externalizing behavior. Total number of ODD symptoms was entered in the first block and acted as a significant predictor, $F(1, 198) = 63.04, p < .001, R^2 = .241$. Child age was entered into the model and did not add to the predictive power of the model, $R^2 \Delta = .011$, nor was the interaction term between number of symptoms and age significant, $R^2 \Delta = .001$. Thus, number of ODD symptoms was a significant predictor of externalizing scores on the CBCL. However, the analysis failed to support the hypothesis that age would moderate the relationship between symptom count and severity of externalizing behavior.

The third model examined the predictive power of CD symptoms and child age in rates of aggressive behavior. In this analysis, scores from the aggression scale of the CBCL were regressed upon total number of CD symptoms, child age, and an interaction term between CD symptoms and child age to test the hypothesis that age would moderate the relationship between CD symptom count and severity of externalizing behavior. Total number of CD symptoms was entered in the first block and acted as a significant predictor, $F(1, 199) = 51.51, p < .001, R^2 = .206$. Child age was entered into the model and did not add to the predictive power of the model, $R^2 \Delta = .002$, nor was the interaction term between number of symptoms and age significant, $R^2 \Delta = .001$. Thus, number of CD symptoms was a significant predictor of aggression scores on the CBCL. However, the analysis failed to support the hypothesis that age would moderate that relationship between symptom count and severity of aggressive behavior.

In sum, this study failed to find support for the hypothesis that age would significantly moderate the relationship between symptom count and the severity of problem behaviors. However, it should be noted that the sample represented a limited age range, and thus it may have been difficult to find differences by age.

Table 3.1. Participant characteristics.

	Total Sample	GIFT	SHAPE	GANNA
Age (years)	$M = 4.48$ $SD = 1.01$	$M = 4.38$ $SD = 1.09$	$M = 4.85$ $SD = 0.75$	$M = 4.33$ $SD = 1.31$
Gender	71% male	69% male	74% male	80% male
Ethnicity				
Caucasian	56%	76%	76%	7%
African American	7%	8%	14%	0%
Hispanic	25%	3%	1%	91%
Asian	0.5%	1%	0%	0%
Native American	0.5%	0%	4%	0%
Biracial/Other				
	10%	12%	5%	2%
Family yearly income	$M = 36,278.83$ $SD = 29,779.31$	$M = 34,308.52$ $SD = 25,302.84$	$M = 54,251.54$ $SD = 39,681.04$	$M = 22,582.25$ $SD = 13,299.15$
CBCL Externalizing T Score	$M = 70.57$ $SD = 8.95$	$M = 72.82$ $SD = 6.91$	$M = 69.00$ $SD = 9.05$	$M = 67.49$ $SD = 11.07$
CBCL Internalizing T score	$M = 61.91$ $SD = 9.91$	$M = 62.54$ $SD = 9.58$	$M = 59.83$ $SD = 9.95$	$M = 62.67$ $SD = 9.63$
ECBI Intensity Raw score	$M = 169.56$ $SD = 28.41$	$M = 168.34$ $SD = 25.06$	$M = 154.08$ $SD = 29.68$	$M = 182.58$ $SD = 26.95$

Table 3-2. Individual symptom percentages across the DISC-IV, YC-DISC, and ECI-4

Symptom	DISC-IV (GIFT; <i>n</i> = 99)	YC-DISC (SHAPE; <i>n</i> = 53)	ECI-4 (GANA; <i>n</i> = 55)
ADHD-Inattentive			
Careless mistakes	43	67	24
Short attention span	55	87	35
Doesn't listen	93	93	46
Fails to finish tasks	70	91	51
Disorganized	53	76	40
Avoids concentrating	52	82	27
Loses items	44	65	36
Distractible	70	89	64
Forgetful	41	72	33
ADHD-Hyperactive			
Fidgets	74	91	66
Leaves Seat	81	85	66
Runs/Climbs	90	91	76
Too Loud	63	67	55
Driven by motor	77	85	66
Excessive talking	71	78	56
Blurts out answers	48	59	31
Difficulty waiting turn	78	85	58
Interrupts	90	94	49
ODD			
Loses temper	95	74	36
Argues	96	80	51
Defiant	95	90	75
Annoys others	76	63	56
Blames others	51	56	49
Easily annoyed	75	59	47
Angry	84	70	40
Spiteful	61	39	43
CD			
Bullying	42	22	11
Fighting	27	24	16
Use of weapon	26	15	4
Cruel to people	24	9	9
Cruel to animals	27	15	5
Stole with confrontation	5	2	**
Forced sex*	0	0	2
Firesetting*	1	0	2
Destruction of property	50	50	10
Breaking and entering*	0	0	**
Lying	23	33	15
Stole without confrontation	29	31	**
Missed curfew*	0	0	**
Runaway*	0	0	**
Truancy*	0	0	**
Stealing composite***	29	31	2

*Dropped from further analyses due to low frequency; **Not asked on ECI-4; ***Combination of stealing with and without confrontation

Table 3-3. Percentage of diagnosis across assessment method

	• DISC-IV • (GIFT; <i>N</i> = 99)	• YC-DISC • (SHAPE; <i>N</i> = 53)	• ECI • (GANA; <i>N</i> = 55)
• ADHD- Inattentive	• 1	• 5	• 4
• ADHD- Hyperactive	• 24	• 11	• 32
• ADHD- Combined	• 46	• 76	• 22
• ODD	• 91	• 79	• 56
• CD	• 42	• 29	• 9

Table 3-4. Absolute, relative, and component model fit for three DSM-IV CFA models

Model	χ^2	DF	<i>p</i>	CFI	TLI	RMSEA	WRMR
DSM-IV (4 factor)	170.66	82	< .001	.95	.96	.06	1.0
Combined ADHD (3 factor)	177.05	88	< .001	.93	.95	.07	1.1
Disruptive behavior (3 factor)	174.90	89	< .001	.93	.95	.07	1.1

Table 3-5. Four-factor solution of DSM-IV symptoms

	ADHD-I	ADHD-H	ODD	CD
Symptom				
ADHD-I				
Careless mistakes	.74			
Short attention span	.90			
Doesn't listen	.89			
Fails to finish tasks	.86			
Disorganized	.73			
Avoids concentrating	.80			
Loses items	.74			
Distractible	.90			
Forgetful	.76			
ADHD-H				
Fidgets		.81		
Leaves Seat		.88		
Runs/Climbs		.88		
Too Loud		.82		
Driven by motor		.90		
Excessive talking		.68		
Blurts out answers		.67		
Difficulty waiting turn		.69		
Interrupts		.72		
ODD				
Loses temper			.67	
Argues			.84	
Defiant			.89	
Annoys others			.72	
Blames others			.71	
Easily annoyed			.68	
Angry			.74	
Spiteful			.65	
CD				
Bullying				.79
Fighting				.63
Use of weapon				.77
Cruel to people				.68
Cruel to animals				.46
Destruction of property				.71
Lying				.73
Stealing composite				.71

Table 3-6. Correlations among DSM-IV factors

	ADHD- Inattentive	ADHD- Hyperactive	ODD	CD
ADHD-I	1.00			
ADHD-H	.81	1.00		
ODD	.49	.54	1.00	
CD	.35	.39	.74	1.00

Table 3-7. Pearson correlations between symptom counts and CBCL and ECBI scores

	ADHD symptoms			ODD symptoms			CD symptoms		
	DISC-IV	YC-DISC	ECI-4	DISC-IV	YC-DISC	ECI-4	DISC-IV	YC-DISC	ECI-4
Attention Scale	.49**	.43**	.52**	.02	.09	.32*	.08	.02	.26*
Aggression Scale	.29**	.20	.33*	.37**	.41**	.49**	.45**	.46**	.34*
Externalizing Scale	.31**	.24	.43**	.37**	.41**	.51**	.41**	.43**	.35**
ECBI intensity score	.42**	.47**	.30*	.27**	.61**	.19	.42**	.51**	.33*

*p< .05, **p<.01.

Table 3-8. Absolute, relative, and component model fit for ECBI models

Model	χ^2	DF	<i>P</i>	CFI	TLI	RMSEA	WRMR
Three-factor CFA	805.24	53	<.0001	.75	.86	.27	2.28
One-factor CFA	356.84	66	<.0001	.92	.97	.15	1.2

Table 3-9. The CFA of the three-factor model of the ECBI

ECBI item	Factor One	Factor Two	Factor Three
12. Gets angry when doesn't get own way	.94		
10. Acts defiant when told to do something	.93		
8. Does not obey house rules on own	.90		
14. Sassses adults	.82		
9. Refuses to obey until threatened with punishment	.76		
13. Has temper tantrums	.50		
11. Argues with parents about rules	.41		
5. Refuses to do chores when asked	.47		
7. Refuses to go to bed on time	.45		
17. Yells or screams	.36		
30. Is easily distracted		.96	
34. Has difficulty concentrating on one thing		.90	
32. Fails to finish task or projects		.88	
31. Has short attention span		.56	
24. Verbally fights with friends own age			.87
22. Lies			.85
26. Physically fights with friends own age			.84
25. Verbally fights with sisters and brothers			.55
27. Physically fights with sisters and brothers			.53
19. Destroys toys and other objects			.21
23. Teases or provokes other children			.15
21. Steals			-.47

Table 3-10. One-factor CFA of the ECBI

ECBI item	
10. Acts defiant when told to do something	.89
8. Does not obey house rules on own	.89
13. Has temper tantrums	.89
32. Fails to finish task or projects	.89
6. Slow in getting ready for bed	.83
30. Is easily distracted	.83
34. Has difficulty concentrating on one thing	.83
36. Wets the bed	.83
2. Dawdles or lingers at mealtime	.80
22. Lies	.79
4. Refuses to eat food presented	.77
18. Hits parents	.76
26. Physically fights with friends own age	.75
9. Refuses to obey until threatened with punishment	.74
28. Constantly seeks attention	.73
24. Verbally fights with friends own age	.72
20. Is careless with toys and other objects	.61
31. Has short attention span	.53
7. Refuses to go to bed on time	.51
5. Refuses to do chores when asked	.45
14. Sasses adults	.44
16. Cries easily	.41
12. Gets angry when doesn't get own way	.36
35. Is overactive or restless	.06
29. Interrupts	.01

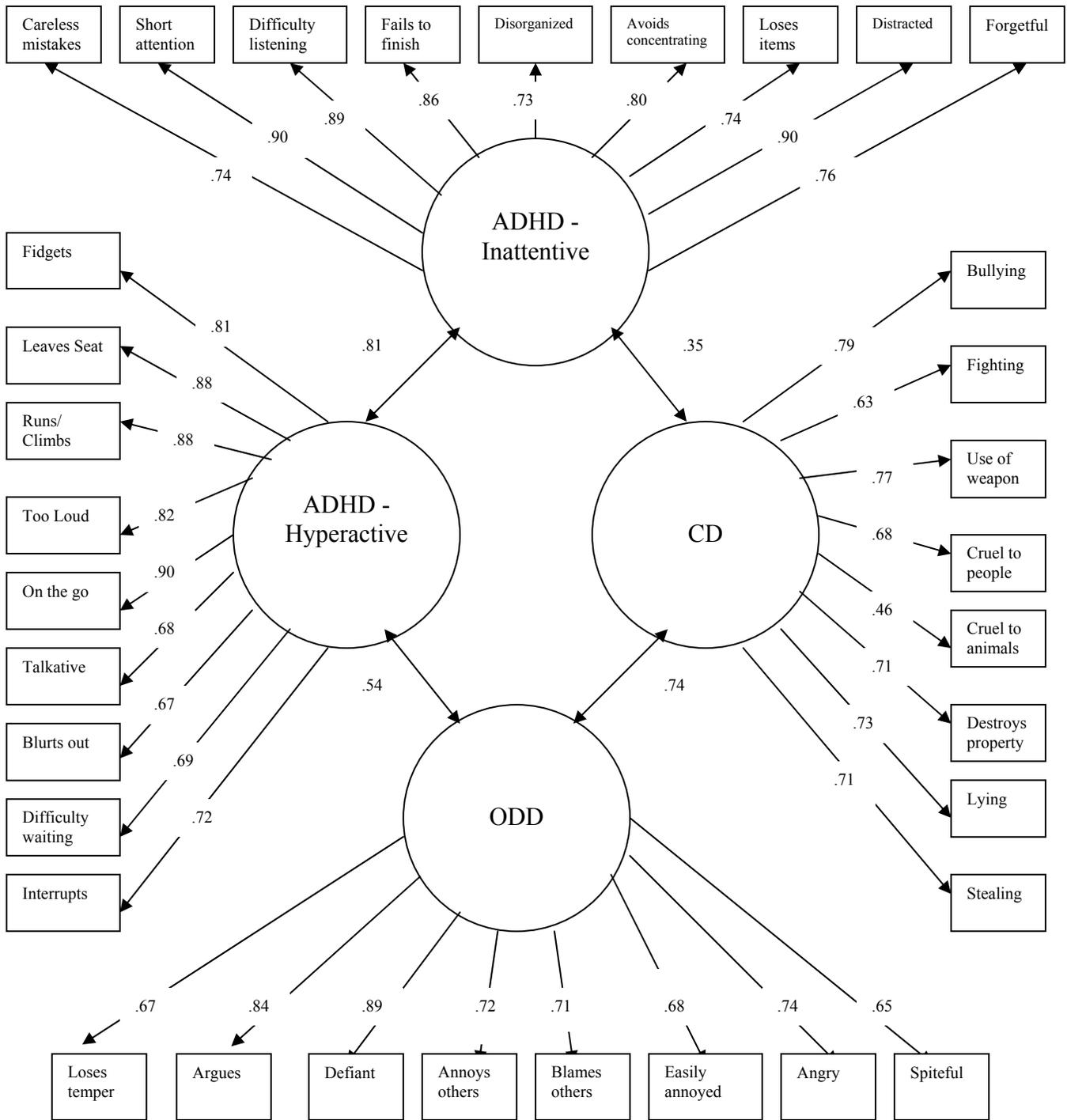


Figure 3-1. Path diagram of four-factor solution of DSM-IV symptoms of ADHD-Inattentive, ADHD-Hyperactive, ODD, and CD.

CHAPTER 4 DISCUSSION

The present study provided important information regarding the validity of DSM-IV symptoms of ODD, CD, and ADHD in a relatively diverse, clinical preschool sample. Findings also provide support for the validity of current assessment measures for preschoolers. Results can be used to inform future diagnostic methodology and assessment techniques in this population. Ultimately, findings from the current study can support effective assessment and treatment of psychopathology in preschoolers.

Validity of the DSM-IV for Preschoolers

Results suggest that the four constructs of ODD, CD, ADHD-Inattentive and ADHD-Hyperactive implied by the DSM-IV are valid in younger children. Even when using the relatively conservative standards outlined by Yu and Muthén (2002), indices suggested good fit. The factor loadings of each symptom onto its corresponding underlying construct were generally high. None fell beneath the commonly used level of .4 (Floyd & Widaman, 1995) and only one symptom had a factor loading below .6. Results generally support the growing body of research supporting the structure of the DSM-IV in older children (Lahey et al., 2004; Lahey et al., 2008) and adds to the limited body of research examining the validity of DSM-IV nosology in preschoolers.

The four-factor DSM-IV model provided the best fit in this sample of clinic-referred preschoolers when compared to a three-factor model that combined the inattentive and hyperactive domains into a single ADHD factor, with separate constructs of ODD and CD. The DSM-IV model also proved superior when compared to a three-factor model of ADHD-Inattentive, ADHD-Hyperactive, and a disruptive behavior factor that collapsed ODD and CD symptoms. The two alternate models resulted in adequate fit according to certain fit indices;

however, inferential chi-square testing allowed direct comparison of the three models and found support for the four-factor model. This is an important finding that adds to the limited research on the validity of separate ODD and CD factors in younger children. Two previous studies found similar results in large, nonclinical samples of school-aged children and adolescents (Lahey et al., 2008; Burns et al., 1997). However, a recent study of DSM symptoms in 307 preschoolers found support for collapsing ODD and CD symptoms into a single disruptive behavior factor (Sterba, Egger, & Angold, 2007). Thus, the present study is the first to find support for the differentiation of CD from ODD specifically in a preschool population. The clinical nature of the sample may explain the discrepancy from the results by Sterba, Egger, and Angold (2007). Given the extreme nature of many of the CD criteria, it may be difficult to establish a clear CD factor in a community sample, particularly in younger children. Although more research is needed, the present study adds to a small but growing body of literature that supports the validity of CD in preschoolers (Schuhmann, Foote, Eyberg, Boggs, & Algina, 1998; Keenan & Wakschlag, 2000; Wilens et al., 2002).

Although results of this study support a separate CD factor, it is notable that several CD symptoms were dropped from analyses due to low frequency: forcing sexual activity, fire-setting, breaking and entering, missing curfew, running away, and truancy. This is hardly surprising in light of preschoolers' developmental abilities and limited exposure to these types of situations. However, the current DSM-IV provides no developmental modifications to current CD criteria. Amidst claims that the diagnosis of CD is irrelevant to preschoolers, it seems important to increase the developmental sensitivity of CD criteria for this age group. The Task Force on Research Diagnostic Criteria for Infancy and Preschool (RDC-PF; 2003) has dropped breaking and entering, breaking curfew, running away, and truancy; thus, it seems likely that the DSM-V

will exclude these symptoms in the assessment of preschoolers. Further research is needed on potential modifications to CD criteria to increase developmental sensitivity while also maintaining the clinical essence of the symptoms (Egger & Angold, 2006).

Results also confirm the validity of two separate factors of inattention and hyperactivity within the ADHD domain, specifically in a preschool sample. A substantial body of research supports this distinction in older children and adolescents (Glutting, Youngstrom, & Watkins, 2005; Willoughby, Curran, Costello, & Angold, 2000). Some research has suggested that a single ADHD factor is most appropriate for younger children (Bauermeister, 1992). Yet results from our study replicate recent findings by Sterba, Egger, and Angold (2007) and add to the validity of the DSM-IV model of ADHD in young children. Nevertheless, further study is needed. Given the necessity of ADHD symptoms in the school setting for diagnosis, it will be particularly important to validate the two domains of inattention and hyperactivity with teacher ratings. Data from the Preschoolers with Attention Deficit/Hyperactivity Disorder Treatment Study (PATS) found conflicting results between parent and teacher ratings of ADHD symptoms. Specifically, the two-factor model of inattention and hyperactivity provided adequate fit when applied to parent responses on a behavior rating scale of ADHD symptoms, but neither a one-factor nor two-factor model provided adequate fit for teacher ratings (Hardy et al., 2007). The authors note that the use of a behavior rating scale may not have provided the most accurate representation of DSM symptoms; thus, the failure of the study to find support for the two-factor model may reflect a methodological artifact. However, it also may be that the structure of ADHD symptoms is different when applied to classroom behavior (Hardy et al., 2007).

This study focused on the validity of specific diagnostic categories in preschoolers. The validation of psychopathology for preschoolers is an important step. However, more research is

needed to demonstrate the clinical utility of these specific disorders in young children. As noted by Huffine (2002), treatment recommendations for CD are virtually identical to those for ODD, leading some to question the utility of two separate disorders. This argument seems particularly relevant to preschoolers because the more intensive, multimodal treatment programs sometimes used to treat CD, such as Multisystemic Therapy (MST; Henggeler & Borduin, 1990) would be inappropriate for preschoolers. A similar argument may be relevant when discussing the clinical diagnosis of ADHD. Treatment recommendations for ADHD in school-aged children and adolescents frequently involve a medication trial and more individualized behavioral interventions, such as organizational skills training. Results from the Preschoolers with Attention Deficit/Hyperactivity Disorder study (PATS) suggest that stimulant medications can be effective in this age group (Greenhill et al., 2006; Vitiello et al., 2007). However, the efficacy of stimulant medication tends to be less (Greenhill et al., 2006) and the side effects more severe when compared to school aged children and adolescents (Wigal et al., 2006). Notably, no medication is currently approved by the Food and Drug Administration (FDA) for the treatment of ADHD in preschool aged children. A recent study examined maternal perceptions of mental health services for their preschool-aged children. The majority of mothers surveyed expressed interest in receiving assistance in managing their child's behavior problems; however, most also indicated that they would not be interested in pursuing medication (Harwood, O'Brien, Carter, & Eyberg, under review). Due to the controversy surrounding medication use in this age group, and parental concerns regarding the safety of medication for young children, first line treatment recommendations for preschoolers with ADHD often involve behavioral interventions such as parent training and contingency management, the same treatments used for ODD/CD in young children (dosReis, et al., 2003; Rushton, Fant, & Clark, 2004; Verduin, Abikoff, & Kurtz, 2008).

The efficacy of these types of behavioral interventions, and specifically parent training programs, is well-established for the treatment of ODD/CD in young children (Eyberg, Nelson, & Boggs, 2008). The results of our study do not support the lesser differentiation in the presentation of psychopathology in preschoolers. However, treatment of externalizing disorders, specifically for this population, may involve many of the same components. Due to their developmental level and the significance of the parent-child relationship at this young age, a range of presenting problems in preschoolers may be improved with comprehensive parent training programs that apply behavioral strategies to a broad spectrum of child problem behaviors (Chase & Eyberg, 2008).

Validity of Assessment Measures

Results also provided validity for the DISC-IV, YC-DISC, and ECI-4 in a clinical preschool sample. Regardless of the diagnostic approach, symptoms across diagnostic categories correlated most highly with their conceptual counterpart on the Child Behavior Checklist (CBCL). These correlations tended to be of similar magnitude for each assessment method. Additionally, symptom counts across the three studies generally demonstrated similar correlations with the ECBI intensity score. Some variability was seen in the correlations between the ECBI and ODD symptom counts. Specifically, ODD symptoms as assessed by the DISC-YC demonstrated the highest correlation with the ECBI. ODD symptoms from the DISC-IV resulted in a small but significant correlation with the ECBI, while ODD symptoms from the ECI-4 were not significantly correlated with the ECBI intensity score. However, this result is likely related to the restricted range of ODD symptoms in Project GIFT and ECBI scores in Project GANA. As noted previously, the inclusion criteria for Project GIFT necessitated higher rates of ODD symptoms and the inclusion criteria for Project GANA resulted in higher ECBI scores. Thus, the weaker relationship between DISC-IV ODD symptoms and the ECBI and the lack of relationship

between ECI-4 ODD symptoms most likely reflects a methodological weakness of our study rather than a comment on the validity of either the DISC-IV or ECI-4.

Overall, this study provided evidence of convergent validity for the DISC-IV, YC-DISC, and ECI-4 in a preschool sample. This is among the first studies to assess the validity of the DISC-IV specifically in this age group and the validity of the newly developed YC-DISC. Results suggest the two interviews are highly similar in their relationships with other measures of child behavior. Additionally, symptom counts from the ECI-4, although lower than both the DISC-IV and YC-DISC, demonstrated significant correlations with the appropriate subscale of the CBCL. The ECI-4 is a relatively new measure, and this study provides important information regarding its validity as a measure of DSM-IV disorders. Future research on preschool diagnosis should address additional indicators of validity. A particularly important direction is the study of predictive validity of assessment measures for this age group. Although ADHD and the disruptive behavior disorders diagnosed in early childhood have been shown to persist into later childhood and adolescence, symptoms remit in approximately half of children diagnosed in the preschool years (Campbell, 2002). Instruments specifically designed for this age group may relate to improved predictive validity. For example, the YC-DISC has altered the time duration of each symptom and asks about the presence of a behavior over a three-month time span. Longitudinal research will determine whether modifications such as these allow better identification of those children who will continue to exhibit symptoms into later childhood and adolescence. Additionally, modifying the language of certain symptoms to increase developmental sensitivity may improve face validity with this population, as well as overall consumer satisfaction.

Factor Analysis of the Eyberg Child Behavior Inventory

Our study failed to support the three-factor structure of the ECBI reported in the literature (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). The model with factors of oppositional behavior, inattention, and conduct problems yielded a highly significant chi square and did not indicate good fit according to any of the fit indices. Most ECBI items demonstrated significant loadings onto one factor of child behavior problems, consistent with previous studies reporting a one-factor structure of the ECBI (Eyberg, 1992; Colvin, Adams, & Eyberg, 1999; Gross et al, 2007). Several different reasons may explain the failure to replicate the three-factor model. Notably, this is the first study to factor analyze the ECBI with a clinical sample of preschoolers. The two studies that have examined the factor structure of the ECBI specifically with preschoolers both used a community sample, and those two studies led to conflicting results (Weis, Lovejoy, & Lundahl, 2005; Gross et al., 2007).

Certainly, the use of a clinical sample limits the generalizability of the current results. However, it seems particularly important to replicate the three-factor structure in clinic-referred children. The importance of using a clinical sample is highlighted by suggestions in the literature that component scores from the three ECBI factors could be used for diagnostic purposes (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). Weis, Lovejoy, & Lundahl (2005) found support for the three-factor model in a community sample of preschool-aged children. However, the component scores from the individual factors were largely unable to differentiate among the three different disorders in a clinical sample of children aged 4 to 6 years. Specifically, the Oppositional Defiant component did not distinguish children with oppositional behavior from children with attention problems, and the Inattentive component did not differentiate inattentive children from oppositional children. Indeed, the authors found that the full ECBI intensity scale was more useful in differentiating these disorders than the

individual component scores. They suggested that the failure of the component scores to differentiate among the different disorders may reflect the lack of behavioral differentiation in children's symptom expression (Weis, Lovejoy, & Lundahl, 2005). However, our findings from the DSM-IV confirmatory factor analysis argue against a lesser differentiation of symptom presentation in younger children. Results from the current study suggest that the ECBI component scores fail to represent the distinct disorders in the same way that they are conceptualized in the DSM-IV.

Notably, the ECBI was developed prior to the development of the DSM-III and was developed as a unidimensional measure of child disruptive behavior. Although several ECBI items appear to map onto DSM-IV criteria, some may not be clear indicators of DSM symptoms, particularly in a clinical preschool sample. For example, the ECBI item "has short attention span" appears very similar to the DSM-IV ADHD inattentive symptom, "often has difficulty sustaining attention in tasks or play activities." However, expectations for a preschooler's attention span are generally lower as compared to school-aged children and adolescents (Silk et al., 2000). A "short attention span" in a 4 year-old may be viewed as problematic by the child's parent or caregiver; however, it also may be less indicative of pervasive attention difficulties in a younger child. As a child matures and expectations for the ability to attend increase, "short attention span" may be more likely to reflect a significant problem with attention, and thus a stronger indicator of the construct of ADHD-Inattentive Type. The wording of DSM-IV items may be particularly important when assessing for these specific symptoms in preschoolers. Indeed, when discussing developmental modifications of current DSM-IV criteria for preschoolers, researchers have highlighted the importance of developmentally appropriate modifications that maintain the clinical meaning of a particular symptom (Egger & Angold,

2004). Differentiating components of the ECBI may be more relevant for older children, when certain behaviors are inherently more problematic and more indicative of specific disorders.

Exploration of Age-Graded Criteria

Our study failed to find support for the use of age-graded criteria in assigning diagnoses among 3- to 6-year-olds. Symptom counts of ADHD, ODD, and CD served as significant predictors of behavior severity, as measured by the corresponding scale on the CBCL. However, age failed to moderate that relationship. The failure to find support for our hypothesis is likely related to the truncated age range of the sample. The study of age-related criteria would be more appropriate across larger age ranges. In their comprehensive review of the presentation and epidemiology of psychopathology in preschoolers, Egger and Angold (2006) systematically evaluated the DSM qualification that behaviors included in ODD criteria must occur “often” in order to represent a true symptom. ODD symptoms naturally occur at a higher frequency in preschool populations as compared to school-aged children. Thus, applying the cutoff criteria previously used for school-aged children (above the 90th percentile) for preschoolers would have overestimated rates of ODD. This example highlights the importance of using established developmental norms in determining the presence of a symptom (Egger & Angold, 2006), and supports further study of the use of developmentally modified criteria for different age groups.

Study Limitations

In an effort to increase sample size and the demographic diversity of the study sample, this study included participants from three different studies. Although all studies examined the efficacy of Parent-Child Interaction Therapy (PCIT) in the treatment of disruptive behavior disorders and/or ADHD in preschoolers, each study varied in its inclusion criteria. Consequently, participants differed in diagnostic presentation and demographic characteristics, introducing variability that may have affected the results. Notably, to provide the sample size necessary,

symptoms entered into the factor analysis were assessed with different instruments. However, all items mapped onto DSM-IV criteria. Indeed, the confirmation of the DSM-IV structure despite the methodological difference may argue for the strength of the DSM-IV model. Also of note, we found few differences in the convergent validity of the different measures, suggesting that they may provide similarly accurate diagnostic information.

Drawing participants from different studies also introduced variability in the versions used for study measures. Specifically, children from Project GIFT were assessed with an older version of the CBCL (Achenbach; 1991; Achenbach, 1992) than children in Projects SHAPE and GANA (Achenbach; 2000; Achenbach; 2001). Although these versions were highly similar, particularly in the subscales of interest for this study, there were some differences across measures. Perhaps most importantly, the 1992 version of the CBCL for 2 and 3-year-old children did not include an Attention Problems subscale. Thus, 3 year-old children from Project GIFT were excluded from the analyses involving this measure. However, this represented a relatively small group of children relative to the entire sample, and it seems unlikely that their inclusion would have significantly changed the results.

A relatively small sample size is another limitation of the current study. Our sample of 207 was enough to meet the recommendation of 5 cases per item when conducting factor analysis (Floyd & Widaman, 1995). However, larger sample sizes are considered optimal for factor analysis. The sample size also prevented cross-validation of either the DSM-IV or ECBI model by age, race, or gender. Overall, previous research with older children and adolescents supports the factors implied by the DSM-IV across age groups and gender (Lahey et al., 2008). However, it will be important to confirm factor invariance in younger children.

The sample size may have affected the clarity of our results, particularly for the factor analysis of the ECBI. Our findings resulted in an unclear factor structure, which was inconsistent with some earlier research in this area (Burns & Patterson, 1991; Burns & Patterson, 2000; Weis, Lovejoy, & Lundahl, 2005). However, it is notable that our results are more consistent with a recent factor analytic study of the ECBI in a sample of 682 preschoolers (Gross et al., 2007). Overall, results in this area of the literature are conflicted, highlighting the need for future studies that examine the factor structure of the ECBI in larger samples.

Despite these limitations, findings provide valuable information on current diagnostic standards and measures for the preschool population. The clinical nature of the sample is a particular strength of the current study. Much of the literature examining issues of diagnostic validity for this age group often involves community samples of non-referred children. Although results from this study may not be generalized to non-clinical children, it seems particularly important to focus on the children that exhibit the specific disorders. This may be particularly important in examining diagnosis of CD in preschoolers, as our results found support for two separate factors of ODD and CD in contrast to findings by Sterba, Egger, & Angold (2007). Their sample of 307 preschoolers recruited from a primary care clinic may have been less representative of children with externalizing disorders. The severity of the CD criteria may make it difficult to establish a clear CD construct in non-clinical samples, particularly in younger children, for whom certain behaviors are developmentally irrelevant to diagnosis. The discrepancy of these results highlights the importance of future research that examines CD symptoms in both clinical and nonclinical samples. Specifically, further study should involve a broader range of clinical severity, perhaps including children from psychiatric inpatient units or day treatment facilities.

Future Directions

This study adds to the limited literature on the validity of current diagnostic standards and assessment methods for preschoolers. Overall, results suggest that DSM-IV categories and common assessment measures are appropriate for this age group. Future research should continue to examine the validity and reliability of preschool diagnosis. An important area of research includes the predictive validity of preschool diagnosis. Although a growing body of research supports DSM disorders in preschoolers, it is unknown which preschoolers will continue to demonstrate symptoms into childhood and adolescence. Longitudinal research is needed on long-term outcomes of children diagnosed with disruptive behavior disorders in early childhood. Further research in this area will increase our understanding of the factors that distinguish developmental variations from true psychopathology and promote the continuing evolution of the DSM.

APPENDIX
 STATISTICAL ANALYSES NOT INCLUDED IN MAIN TEXT

Table A-1. One-factor EFA of the Eyberg Child Behavior Inventory(ECBI) (RMSR = .10)

ECBI item	
12. Gets angry when doesn't get own way	.89
8. Does not obey house rules on own	.88
10. Acts defiant when told to do something	.87
30. Is easily distracted	.87
28. Constantly seeks attention	.84
6. Slow in getting ready for bed	.83
34. Has difficulty concentrating on one thing	.82
32. Fails to finish task or projects	.82
35. Is overactive or restless	.80
14. Sasses adults	.79
2. Dawdles or lingers at mealtime	.79
20. Is careless with toys and other objects	.79
16. Cries easily	.78
4. Refuses to eat food presented	.75
22. Lies	.72
9. Refuses to obey until threatened with punishment	.71
24. Verbally fights with friends own age	.69
26. Physically fights with friends own age	.67
18. Hits parents	.63
36. Wets the bed	.61
29. Interrupts	.56
31. Has short attention span	.46
13. Has temper tantrums	.46
7. Refuses to go to bed on time	.45
21. Steals	-.44
5. Refuses to do chores when asked	.42
15. Whines	.40
17. Yells or screams	.36
11. Argues with parents about rules	.35
1. Dawdles in getting dressed	.26
3. Has poor table manners	.22
19. Destroys toys and other objects	.12
23. Teases or provokes other children	-.06
33. Has difficulty entertaining self alone	.05
25. Verbally fights with sisters and brothers	.01
27. Physically fights with sisters and brothers	.01

Table A-2. Two-factor EFA of the Eyberg Child Behavior Inventory(ECBI) (RMSR = .08)

ECBI item	Factor One	Factor Two
12. Gets angry when doesn't get own way	.93	.12
8. Does not obey house rules on own	.89	.05
10. Acts defiant when told to do something	.89	.08
30. Is easily distracted	.88	.03
6. Slow in getting ready for bed	.85	.08
2. Dawdles or lingers at mealtime	.84	-.16
32. Fails to finish task or projects	.83	.02
14. Sasses adults	.81	.10
16. Cries easily	.81	-.09
34. Has difficulty concentrating on one thing	.80	.06
4. Refuses to eat food presented	.78	.11
35. Is overactive or restless	.77	.08
20. Is careless with toys and other objects	.76	.12
9. Refuses to obey until threatened with punishment	.70	.03
22. Lies	.68	.13
24. Verbally fights with friends own age	.67	.07
18. Hits parents	.65	.08
36. Wets the bed	.64	-.09
26. Physically fights with friends own age	.63	.14
29. Interrupts	.47	.32
28. Constantly seeks attention	.46	.32
7. Refuses to go to bed on time	.40	.19
31. Has short attention span	.39	.28
13. Has temper tantrums	.39	.25
5. Refuses to do chores when asked	.35	.25
15. Whines	.34	.17
11. Argues with parents about rules	.30	.16
17. Yells or screams	.28	.25
1. Dawdles in getting dressed	.24	.08
3. Has poor table manners	.11	.38
33. Has difficulty entertaining self alone	.01	.15
19. Destroys toys and other objects	-.07	.68
23. Teases or provokes other children	-.20	.65
25. Verbally fights with sisters and brothers	-.18	.66
27. Physically fights with sisters and brothers	-.17	.61
21. Steals	-.61	.57

Table A-3. Three-factor EFA of the Eyberg Child Behavior Inventory(ECBI) (RMSR = .06)

ECBI item	Factor One	Factor Two	Factor Three
12. Gets angry when doesn't get own way	.91	.05	.01
26. Physically fights with friends own age	.84	-.31	-.23
28. Constantly seeks attention	.83	.04	.05
24. Verbally fights with friends own age	.81	-.20	-.15
30. Is easily distracted	.78	.03	.17
14. Sasses adults	.76	.06	.09
34. Has difficulty concentrating on one thing	.74	-.07	.15
20. Is careless with toys and other objects	.74	.14	.11
10. Acts defiant when told to do something	.72	.12	.26
32. Fails to finish task or projects	.72	.03	.20
22. Lies	.72	-.19	.02
8. Does not obey house rules on own	.71	.08	.28
35. Is overactive or restless	.68	-.06	.21
18. Hits parents	.67	.01	-.03
36. Wets the bed	.66	.02	-.04
6. Slow in getting ready for bed	.66	.13	.29
2. Dawdles or lingers at mealtime	.61	.23	.33
16. Cries easily	.60	.15	.31
4. Refuses to eat food presented	.60	.15	.26
9. Refuses to obey until threatened with punishment	.45	.09	.42
29. Interrupts	.34	-.22	.33
31. Has short attention span	.28	-.20	.29
23. Teases or provokes other children	.00	-.70	-.05
19. Destroys toys and other objects	.02	-.65	.12
25. Verbally fights with sisters and brothers	-.06	-.64	.06
27. Physically fights with sisters and brothers	-.01	-.62	.00
21. Steals	-.59	-.46	.17
3. Has poor table manners	-.19	-.16	.63
5. Refuses to do chores when asked	.09	-.07	.52
7. Refuses to go to bed on time	.14	-.02	.50
1. Dawdles in getting dressed	-.05	.10	.49
15. Whines	.09	-.02	.46
11. Argues with parents about rules	.08	-.01	.43
17. Yells or screams	.14	-.14	.34
13. Has temper tantrums	.26	-.16	.31
33. Has difficulty entertaining self alone	-.11	-.05	.24

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