Hyperactivity, Impulsivity, and Inattention in Young Children

Mary Margaret Gleason
Kathryn L. Humphreys

*S*evere hyperactivity and impulsivity are among the most common reasons for referral to mental health professionals in early childhood. These symptoms can be associated with a range of diagnoses that require careful assessment to differentiate among typical development, child psychopathology, and caregiver expectations. In some cases, the clinical syndrome is well characterized as attention-deficit/hyperactivity disorder (ADHD), a well-established neurodevelopmental disorder that can present early and is fairly stable over the course of development. In the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), ADHD is defined by an age by which the symptoms must present, but without a lower age limit, before which the syndrome cannot be diagnosed (American Psychiatric Association, 2013). In Zero to Three's most recent *Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood* (DC:0–5), ADHD appears for the first time (Zero to Three, 2016). We review in this chapter the criteria for ADHD and overactivity disorder of toddlerhood (OADT) in DC:0–5, and discuss the rationale for the criteria, evidence supporting validity and reliability of the diagnoses in very young children, and the clinical implications.

Development of DC:0–5

Past versions of the early childhood DC nosology included only those diagnoses not included or well characterized in DSM or *International Classification of Diseases* (ICD) nosology. DC:0–5 is more inclusive, offering clinicians a nosology that can characterize the clinical presentations of very young children, including those with early-onset signs of ADHD. This inclusive approach of DC:0–5 nosology and rigorous application of the diagnostic criteria are expected to promote effective communication among providers about clinical disorders and encourage further research focused on disorders of hyperactivity and impulsivity in very young children.

As part of the developmental process of DC:0–5, international infant mental health providers were surveyed about DC:0–3R and about clinical diagnoses in young children. The respondents, early childhood mental health clinicians, researchers, and advocates about criteria

for the DC nosology, stressed the importance of distinguishing between typical development and the clinical disorders of ADHD and OADT (Zero to Three, 2015). Although this distinction is always important, disorders with criteria that include extremes of otherwise typical behavioral patterns tend to trigger these concerns more than disorders whose criteria include more atypical behaviors. However, it is also true that there are notable risks of delaying identification of a well-established neurodevelopmental process for which safe and effective interventions exist.

Diagnostic Criteria and Rationale

In DC:0–5, the diagnosis of ADHD requires that children be at least 36 months of age. The diagnostic criteria are based on existing literature that has demonstrated validity of 18 signs of ADHD, nine representing the hyperactive/impulsive cluster and nine representing the inattentive cluster. Younger children's specific presentation of these signs may differ from that of older children, and the criteria describe patterns that represent developmentally atypical patterns of behavior. Children must present with at least six of the nine signs of hyperactivity/impulsivity and/or six of the nine signs of inattentiveness. Signs of both hyperactivity and inattention are based on the criteria used in most research studies, with adaptations that describe the presentation in typical activities of very young children. For example, instead of the DSM criterion of "failing to give close attention to detail," DC:0–5 focuses on a child who is usually "inattentive to details in play, activities of daily living, and/or structured activities (e.g., makes developmentally unexpected accidents or mistakes)" (American Psychiatric Association, 2013; Zero to Three, 2016). The syndrome must be persistent, occur in more than one setting or relationship, and cause significant impairment for at least 6 months. Perhaps most importantly, the clinical signs of ADHD must be excessive compared to cultural and developmental norms.

OADT describes a syndrome of extreme, developmentally excessive hyperactivity and impulsivity in children 24–36 months old. The focus is exclusively on hyperactive and impulsive behavioral signs, and does not include an inattention cluster. To meet the diagnostic threshold for OADT, children must demonstrate six of the nine hyperactivity/impulsivity signs in more than one setting or relationship, cause significant impairment, and have been present for at least 6 months.

Specific Diagnostic Signs

A question commonly raised about the diagnosis of ADHD in very young children is the degree to which the symptoms are developmentally normative and therefore not indicators of a mental health problem or pathology. The diagnostic criteria in the DC:0–5 system include the same constructs that are described in most research focused on ADHD in preschool- and school-age children. DC:0–5 criteria include developmentally appropriate examples or contexts, such as inattention while looking at a book with a parent and intrusive play with other children. As the "job" of young children is play, the diagnostic criteria focus on the presentation inattention or hyperactivity/impulsivity in play and in relationships with parents, other adults, and peers. The frequency with which children present these signs is specified with broadly defined frequencies, such as "usually" and "often." While more concrete definitions of frequency might appear to reduce the potential for subjectivity, existing research has demonstrated that these frequency definitions are sufficient to discriminate clinically impaired from comparison children (e.g., Egger & Angold, 2006; Lahey et al., 1998). In a review of published reports of prevalence of the signs of ADHD in children 2–5 years old, most of individual signs of ADHD were endorsed by fewer than 10% of parents (Egger, Kondo, & Angold, 2006).

An exception was the criterion focused on interruptions, which was reported significantly more often in children with ADHD than in those without, but was also present at high frequencies and high rates in both groups. Importantly, endorsement of this pattern of frequent interrupting was also associated with higher level of impairment. The criterion focused on interrupting was retained in the criteria of DC:0–5 because of the well-established literature demonstrating discriminant and predictive validity even with its inclusion (Lahey et al., 1998, 2004; Lahey & Applegate, 2001; Lee, Lahey, Owens, & Hinshaw, 2008). Although signs of individual criteria may be observed commonly in the general population, the diagnosis requires that six criteria be met and cause impairment, which means that a single criterion alone does

EBSCO : eBook Collection (EBSCOhost) - printed on 7/2/2019 3:11 PM via TUFTS UNIV
AN: 1843598 ; Zeanah, Charles H..; Handbook of Infant Mental Health, Fourth Edition
Account: s3579704.main.ehost

not lower the diagnostic criterion threshold to a degree that has interfered with diagnostic validity or reliability, or exaggerated the prevalence beyond what would be expected for a neurodevelopmental disorder whose prevalence in older children has been established.

Threshold Number of Signs of ADHD

Most studies of ADHD in preschoolers require a minimum of six signs of hyperactivity/ impulsivity or six signs of inattention when defining the disorder (APA, 2013; Bufferd, Dougherty, Carlson, & Klein, 2011; Egger & Angold, 2006; Gudmundsson et al., 2013; Keenan, Shaw, Walsh, Delliquadri, & Giovannelli, 1997; Lavigne et al., 1996). In these epidemiological studies, 2–5.7% of children ages 3–6 years meet criteria for ADHD using the threshold of six signs, reflecting that despite the perception that all young children are highly active, only a small number of children have sufficient symptoms to meet the diagnostic threshold. A study comparing Swedish preschoolers with ADHD and community controls (mean age 5.0 years) highlighted the substantial difference in the number of signs endorsed (Kadesjo, Kadesjo, Hagglof, & Gillberg, 2001). Children with ADHD had a four- to eightfold higher rate of symptom endorsement on the Diagnostic Instrument for Children and Adolescents. Although only six signs of ADHD were required to meet the diagnostic criteria, children with ADHD were reported to have a mean of 12 symptoms out of a possible 18 and a mean score of 32 on the ADHD Rating Scale, compared with a nonclinical mean score of 8 in community comparison children. Bunte, Shoemaker, Hessen, van der Keijden, and Matthys (2014) explicitly examined the diagnostic threshold in a study of 251 children (42–66 months old) referred for externalizing behavior patterns. Using consensus best-estimate diagnosis as the "gold standard," the threshold of six hyperactive/impulsive or inattentive signs yielded 64% sensitivity and 100% specificity. A lower threshold of five criteria produced higher sensitivity (83%) and an insignificant decrement in specificity (98%). The study did not report on sensitivity and specificity of a higher threshold of ADHD criteria (seven or higher), but it seems unlikely that a higher threshold would result in higher sensitivity or specificity than the criteria threshold. Taken together, these findings suggest that a threshold of six signs of ADHD has excellent specificity in preschoolers and is unlikely to result in overdiagnosis when each criterion is examined rigorously. It also suggests that clinical consideration should be given to the clinical needs of children who meet only five criteria within a symptom cluster and show impairment, as this study suggests that this diagnostic threshold provides excellent specificity and such children may require clinical attention. To avoid the risk of overpathologizing typical development, the threshold of six criteria is maintained in DC:0–5 criteria, although further empirical work to explore the most appropriate threshold is warranted.

Age of Onset

In DC:0–5, the criteria require that a child be at least 36 months old and have at least 6 months of symptoms to meet the diagnostic criteria for ADHD. The studies establishing the discriminant and predictive validity of ADHD in young children, reviewed below, have focused on children over 36 months of age (e.g., Bufferd et al., 2011; Kadesjo et al., 2001; Lahey & Applegate, 2001; Lavigne et al., 1996), making this the appropriate lower age limit for ADHD. The presentation of clinically significant hyperactivity and impulsivity in children younger than 36 months is described below.

Overactivity Disorder of Toddlerhood

Some children under 36 months of age present with extremes of hyperactivity and/or impulsivity. Large epidemiological studies in the United States and Norway have demonstrated that signs of ADHD can be reliably identified in children as young as 24–36 months (Bufferd et al., 2011; Egger et al., 2006; Wichstrøm et al., 2012). Inattentive patterns generally increase gradually from 18 months through the preschool years (Galera et al., 2012); however, inattention in toddlerhood has less potential to cause impairment, as there are fewer attentional demands placed on children in most cultures during this developmental period. Thus, data supporting a clinical diagnosis of inattention in toddlerhood are insufficient to support proposal of an ADHD-like inattentive disorder in this age group.

On the other hand, hyperactivity/impulsivity shows remarkable stability over time in the toddler years through the school-age years. In a large Norwegian study, stability coefficients of hyperactivity and impulsivity based on ma-

EBSCO : eBook Collection (EBSCOhost) - printed on 7/2/2019 3:11 PM via TUFTS UNIV
AN: 1843598 ; Zeanah, Charles H..; Handbook of Infant Mental Health, Fourth Edition
Account: s3579704.main.ehost

ternal reports across four time points (19, 32, 50, and 63 months) were moderate, ranging from 0.39 for the extended interval between 19 months and 63 months to 0.66 for the consecutive time points (Leblanc et al., 2008). Stability patterns for paternal reports were similar. In this cohort of 1,112 twins, 7.1% followed a high and stable track over the four time points. This group had substantially higher ratings of hyperactivity/impulsivity at each time point than the other groups, beginning at age 19 months. Importantly, parent reports of hyperactivity/impulsivity at 19 months were significantly associated with teacher reports at 72–84 months, although early hyperactivity/impulsivity only modestly contributed to the variance (1.2%). In another study in which children were followed from 5 months to 8 years of age, stable trajectories were similarly described, although a higher proportion (16%) of this Canadian population (N = 2,120) followed the high-stable trajectory (Galera et al., 2012). Neither of these large population-based studies examined impairment; thus, rates of the "high-stable" children do not reflect prevalence rates of disorder. To our knowledge, only one study has examined the trajectory of hyperactivity in toddlerhood predicting the later categorical diagnosis of ADHD (Overgaard et al., 2015). In this prospective study of 628 Norwegian toddlers, children who met diagnostic criteria for ADHD at 42 months had higher levels of hyperactivity at age 18 months than those with anxiety or with no diagnosis, with an odds ratio of 1.3–1.5. Interestingly, early emotional dysregulation also contributed independently to the outcome of ADHD diagnosis.

It is likely that onset of ADHD is gradual and represents a change in the degree of observable hyperactivity/impulsivity or adaptation to environmental demands rather than an acute onset of altogether new behavioral patterns (Sonuga-Barke & Halperin, 2010). However, for the purposes of a categorical nosology, despite the potential gradual onset, a lower limit of age of onset is necessary. In DC:0–5, the lower age limit for OADT is defined as 24 months, with a requirement of at least 6 months' duration of symptoms. This limit was derived from research studies focused on the developmental trajectory of ADHD, which generally begin at 18 months. In clinical settings, extreme hyperactivity and impulsivity are observable in some children this young. Because of the potential for toddlers to show episodic or intermittent

behavioral dysregulation in response to a range of events, stressors, or experiences, attention to persistence of symptoms is particularly important when applying the diagnosis of OADT.

Duration

The minimum duration of ADHD in very young children has not been examined systematically, and different studies have used different minimum durations to define the syndrome. In a study of Swedish children, signs of ADHD must have been present for at least one year (Kadesjo et al., 2001). In studies employing the Preschool Age Psychiatric Assessment, the syndrome must have been present for the last 3 months (e.g., Bufferd et al., 2011; Egger & Angold, 2006; Egger, Kondo, & Angold, 2006; Wichstrøm et al., 2012). These studies have demonstrated reliability of the ADHD diagnosis in children ages 24–60 months, as well as epidemiological prevalence and stability patterns. In studies that applied the DSM-IV criteria, such as the studies by Lahey and colleagues (2004, 2005), who have examined validity, stability, and correlates of early childhood ADHD, a duration of 6 months was required (American Psychiatric Association, 1994; Lahey et al., 1998, 2004). DSM-5 maintained the 6-month duration requirement (American Psychiatric Association, 2013). Anecdotal clinical experience suggests that most very young children with ADHD present with at least 6 months of impairment, often more, despite the fact that a 6-month period represents a larger proportion of the lives of young children than those of older children and adolescents. Although it is possible that the 6-month duration will prove overly restrictive with further assessment, the diagnostic criteria in DC:0–5 currently maintain the 6-month duration.

The Two-Setting Criterion

The rationale for requiring that ADHD occur in more than one setting or more than one relationship is that it supports the pervasiveness of the behaviors and reduces the risk of misdiagnosing relationship-specific or context-specific behavioral dysregulation as ADHD. In DSM-IV-TR, impairment was required in multiple settings, whereas in DSM-5, symptoms, but not necessarily impairment, are required in multiple settings (American Psychiatric Association, 2000, 2013). The requirement of multisite impairment

has been questioned by some researchers, who noted that this requirement is unique to ADHD, and that very young children who are at home with a single parent during the day may not have opportunities to demonstrate difficulties in other contexts or relationships (e.g., Lahey et al., 2005). When compared with consensus diagnosis as the "gold standard," including the pervasiveness criterion modestly reduced sensitivity of the ADHD diagnosis—from 83 to 77%—without changing specificity, which was 98% for single-context and multisite impairment (Bunte, Schoemaker, Hessen, van der Heijden, & Matthys, 2014). However, predictive validity appears stronger when two settings are required. In a longitudinal study, at 4-year follow-up, preschool-age children with signs of ADHD in only one setting were approximately half as likely to meet full diagnostic criteria as children who showed signs of ADHD in two settings (Lahey et al., 2004). The value of maintaining the higher, two-setting criterion is further supported by data revealing that stability of ADHD is predicted by endorsement of symptoms by at least two reporters (parent, teacher, and/or clinician) (O'Neill, Schneiderman, Rajendran, Marks, & Halperin, 2014).

Impairment

Functional impairment is required for the diagnosis of ADHD in DC:0–5 criteria. Children with high levels of inattention and/or hyperactivity/impulsivity without impairment cannot be considered to have a current clinical disorder. Formal assessment of the degree of impairment a child experiences is not required in the draft DC:0–5 system. To some degree, the impact of ADHD is influenced by the expectations of the family and community, and the flexibility of the caregiving environments to accommodate developmentally atypical patterns of hyperactivity, impulsivity, and/or inattention. In the complex, relational system, clinicians use all information available to assess the degree of impairment and the degree to which it is attributable to ADHD.

In a U.S. sample that included community and clinically referred children, approximately half of preschoolers who had six or more signs of ADHD did not have impairment on a formal impairment scale that examined functioning in seven settings (Healey, Miller, Castelli, Marks, & Halperin, 2008), highlighting the importance of impairment in discriminating disorder from the wide spectrum of typical development. Using increasingly higher thresholds of impairment, such as the 75th or 90th percentile of impairment, resulted in substantially lower rates of ADHD diagnosis even in children with high levels of hyperactivity.

In young children with ADHD, impairment may occur in any domain of life, including family relationships, peer relationships, opportunities to participate in developmentally appropriate activities, and/or learning. Often impairment occurs in multiple domains. Impairment may present with high-risk behaviors or even higher rates of injuries that necessitate intensive protection by parents or medical interventions (Lahey et al., 1998). Preschoolers with ADHD have more difficulties in social interactions (Posner et al., 2007). Developmental issues are common among children with early childhood ADHD (Lahey et al., 1998; Posner et al., 2007). Whether these developmental difficulties represent the sequelae of ADHD or a manifestation of the same neurodevelopmental process causing ADHD, or a combination, is not established in preschoolers. Specifically, ADHD in the preschool years is associated mild intellectual impairment, global developmental deficits, poor preacademic skills, and motor coordination problems (DuPaul, McGoey, Eckert, & VanBrakle, 2001; Gadow & Nolan, 2002; Merrell & Wolfe, 1998; Shelton et al., 1998; Sonuga-Barke, Dalen, Daley, & Remington, 2002; Spira & Fischel, 2005). Relatedly, ADHD in the preschool years is associated with the higher rates of special education services (or eligibility for these supports) than rates for typically developing children (DuPaul et al., 2001; Posner et al., 2007). In a U.S. study, 40% of the preschool children with ADHD had been suspended from school at least once (see Egger et al., 2006), an experience that not only excludes a child from an environment that may support learning but also may have significant financial consequences for families by interfering with parental employment.

Subtypes

In preschoolers, studies of subtypes of ADHD, such as the hyperactive/impulsive type or inattentive type, have proven to have limited predictive validity, although the combined type is associated the highest stability over time (Lahey et al., 2005). In a study of preschoolers ages 4–6 followed longitudinally for 7 or

more years, 90% of children with hyperactive/impulsive type met criteria for one other subtype at least once, and two-thirds of children with either inattentive type or combined type also presented with a different subtype (Lahey et al., 2005). Although some children showed predictable changes in subtype, with the developmentally expected decline in hyperactivity and the increasing importance of attention over time, others did not appear to follow expected patterns. In a separate sample of over 1,000 children followed from age 3–5 years, factor analysis of parent-reported signs of ADHD on a parent rating scale indicated that a single factor, rather than two separate factors, provided the best fit for the model (Willoughby, Pek, Greenberg, & Family Life Project Investigators, 2012). The clinical value of these findings suggests limited value and stability of subtypes in preschoolers, although there is potential for further research related to correlates and mediators of stability of different subtype patterns.

Validity of ADHD and OADT

Concurrent Validity

Concurrent validity of a diagnosis is demonstrated by associations with predicted clinical factors. As in older children, very preterm birth (29 weeks or earlier) has been associated with ADHD symptoms at age 5 years (Morales, Polizzi, Sulliotti, Mascolino, & Perricone, 2013). As expected, preschoolers with ADHD are at higher than usual risk of having risky behaviors and experiencing unintentional injuries, even when researchers control for demographic factors, other symptoms, and IQ (DuPaul et al., 2001; Posner et al., 2007). Demographic factors associated with child exposure to stress, including poverty, parental divorce, and exposure to potentially traumatic events, have been associated with more symptoms of ADHD (Gurevitz, Geva, Varon, & Leitner, 2014; Kadesjo et al., 2001; Keenan et al., 1997; Tandon, Si, Belden, & Luby, 2009). These patterns are similar to the patterns reported in older children with ADHD, suggesting continuity across ages (as reviewed in American Academy of Pediatrics, 2011).

Predictive Validity

Predictive validity of ADHD in preschoolers has been examined, starting in the preschool years through age 8 years. As noted earlier, children with high levels of hyperactivity show notable stability over time, beginning in early toddlerhood. Longitudinally following 4- to 6-year-old children assessed with a structured interview, Lahey and colleagues (2004, 2005) reported that 80% of the 114 children met criteria for ADHD 8 years later. Similarly, in a U.S. study of 168 three-year-olds followed over 4 years, the overall predictive power of ADHD diagnosis using the Diagnostic Interview Schedule for Children was 0.69 (Harvey, Youngwirth, Thakar, & Errazuriz, 2009). Finally, 89% of 3- to 5-year-olds who participated in the Preschool ADHD Treatment Study (PATS) in preschool continued to meet diagnostic criteria for ADHD at 9–12 years of age (Riddle et al., 2013). The children in the PATS were selected for high ADHD severity, which may explain the particularly high rate of stability. Importantly, response to treatment during the psychopharmacological treatment phase of the study did not predict later diagnostic status, suggesting that successful early medication treatment did not mediate the later clinical outcomes. Functional outcomes of preschool ADHD are similarly consistent. In a longitudinal study, compared to children without ADHD, preschoolers with ADHD followed up at 11–13 years of age were less likely to be classified as "well adjusted" on measures of anxiety and depression (64 vs. 89%), social skills (37 vs. 70%), peer relationships (51 vs. 84%), and academic achievement (82 vs. 94%) and have conduct disorder more than peers without ADHD (Lee et al., 2008; Rolon-Arroyo, Arnold, & Harvey, 2014). Preschoolers with ADHD are also at higher risk for learning disorders and academic problems in the school-age period (Cantwell & Baker, 1991). Following further, ADHD symptoms in young children are predictive of depression in young adulthood (Humphreys et al., 2013). Overall, these data highlight the stability of early ADHD, supporting the predictive validity of the disorder and the need for intervention.

Risk and Prognostic Features

Genetic and environmental factors, including abuse and neglect, have been linked to increased risk for ADHD in early childhood (see Humphreys & Zeanah, 2015). Heritability of hyperactivity in preschoolers is approximately 70%, similar to rates in older children (Rietveld, Hudziak, Bartels, Beijsterveldt, & Boomsma, 2004). Research into the specific genes related

EBSCO : eBook Collection (EBSCOhost) - printed on 7/2/2019 3:11 PM via TUFTS UNIV
AN: 1843598 ; Zeanah, Charles H..; Handbook of Infant Mental Health, Fourth Edition
Account: s3579704.main.ehost

to ADHD has occurred primarily in older children, with much attention focused on genes related to dopaminergic, other catecholaminergic, and serotonergic activity and metabolism (Wallis, Russell, & Muenke, 2008). As with most disorders, it is most likely that preschool ADHD develops in the context of complex interactions among genetic, epigenetic, and environmental processes. Specific neurodevelopmental syndromes including fragile X and autism spectrum disorder are associated with high rates of ADHD in older children as well (e.g., Lo-Castro, D'Agati, & Curatolo, 2011).

Environmental factors may also play an influential role in the development of ADHD. For example, children raised in extremes of adverse caregiving environments, such as institutions or orphanages, have approximately a fourfold risk of ADHD in early childhood compared to nonmaltreated preschoolers living in families (Zeanah et al., 2009). Specific caregiving patterns, such as intrusive caregiving, similarly, are especially associated with inattentiveness and hyperactivity (Carlson, Jacobvitz, & Sroufe, 1995). Other noninherited prenatal and postnatal factors are also associated with signs of preschool ADHD. Prenatal exposure to maternal substance abuse, including alcohol use, is associated with signs of preschool ADHD (e.g., Willoughby et al., 2012). Findings related to the association between preschool ADHD and prenatal smoking exposure are mixed, with many, but not all, studies reporting an association (e.g., Lavigne et al., 2011). Perinatal factors, including low birthweight and preterm birth, also predict early hyperactivity and impulsivity (e.g., Galera et al., 2012). Postnatal exposure to lead and central nervous system disorders such as seizures are also associated with higher rates of ADHD. Family factors, including young parental age, parental depression, and isolated family, also increase risk of preschool ADHD (e.g., Galera et al., 2012).

Diagnostic Issues

Culture-Related Diagnostic Issues

Rates of ADHD symptoms in early childhood appear similar across cultures (Bufferd et al., 2011; Egger & Angold, 2006; Gleason et al., 2011; Wichstrøm et al., 2012). The modest variability in rates of diagnosis, as defined by individual criteria *plus* impairment, suggests that cultural expectations about developmentally appropriate behaviors may affect the meaning of functional impairment, which is required for the diagnosis. Clinically, cultural practices and beliefs strongly influence the expectations, perceptions, and interpretation of children's activity level, attention, and impulse control, and every assessment must focus on understanding the chief complaint within the cultural context.

Gender-Related Diagnostic Issues

Some studies of preschool-age children indicate that boys have a greater prevalence of ADHD than girls (Egger, Kondo, & Angold, 2006; Lavigne et al., 1996), although the magnitude of this difference is somewhat less than what is found in older children (Bendiksen, 2017; O'Neill et al., 2014; Posner et al., 2007).

Differential Diagnosis

Especially for very young children, clinicians must consider the differential diagnosis of typical development, a relationship-specific disorder, posttraumatic stress disorder (PTSD), or other Axis I disorder from *DC:0–5* (Zero to Three, 2016) before making a diagnosis of ADHD. Typical development may include temperamental dispositions to high levels of activity and/or impulsivity, but when these do not cause substantial impairment, they are not manifestations of a disorder. Practitioners should be mindful that difficulty meeting developmentally inappropriate expectations, such as requiring young children to sit alone at a desk doing "schoolwork" for extended periods of time, is not functional impairment. Relationship-specific disorders may present with symptoms that are expressed within one relationship but do not generalized to other relationships. PTSD may cause difficulty concentrating, hyperarousal symptoms, and distress that present as disorganized behaviors, but signs of PTSD should be linked to exposure or reminders to the potentially traumatic event and a careful history will reveal other signs of trauma-exposure. Sleep disorders that cause sleep deprivation can present with behavioral patterns similar to ADHD, although parents may sometimes be able to identify a correlation between sleep quality and activity level the next day. Many other disorders, including other anxiety disorders and mood disorders, may cause behavioral dysregulation, but ADHD does not include a pervasive mood or anxiety pattern. Lead toxicity should be consid-

EBSCO : eBook Collection (EBSCOhost) - printed on 7/2/2019 3:11 PM via TUFTS UNIV
AN: 1843598 ; Zeanah, Charles H..; Handbook of Infant Mental Health, Fourth Edition
Account: s3579704.main.ehost

ered an etiological factor in children with signs of ADHD. Absence seizures may present with signs suggestive of inattention symptoms, but may be distinguished because children with a seizure will not respond to verbal cues during the brief epileptic events.

Comorbidity

ADHD frequently co-occurs with other psychiatric disorders, with up to 90% of preschool-age children with ADHD meeting diagnostic criteria for other disorders (Lavigne et al., 1996). Specific patterns of comorbidity vary across the literature, but ADHD can be associated with oppositional defiant disorder (ODD) and internalizing disorders, specifically separation anxiety disorder (SAD) and major depressive disorder (MDD), or with a cluster of ODD, MDD/generalized anxiety disorder (Wichstrøm et al., 2012). In one epidemiological study, ADHD was associated indirectly with internalizing and externalizing disorders, but only through the associations with disruptive behavior disorders (Egger & Angold, 2006).

Diagnosis of ADHD and OADT in Young Children

Clinicians should approach a chief complaint of hyperactivity and impulsivity with an awareness of the broad differential diagnosis of these symptoms in early childhood and an appreciation of the potential for significant functional limitations in children who experience extremes of these behaviors. Clinical assessment of children presenting with hyperactivity, impulsivity, and/or inattentiveness requires a full diagnostic evaluation to confirm the diagnosis of ADHD or OADT, to identify comorbid conditions, and to rule out other disorders. Such an evaluation should include a history of the presenting problem, a full review of other symptoms and symptom clusters, a full developmental and medical history, and observation of the child and parent–child interactions. The history of the presenting problem should include the timing and context of the onset of the problems. Acute onset or onset associated with specific life events may represent adjustment or trauma-related disorders rather than ADHD or OADT. Similarly, episodic or context-specific patterns are less likely to represent ADHD or OADT than some other clinical problem. Attention to traumatic or important life events, mood, anxiety, and overall development across all domains

is critical in assessing ADHD or OADT in very young children. To reduce reliance on a single reporter, obtaining a history from more than one adult is particularly important when considering ADHD or OADT in a very young child. Although, ideally, this information can be obtained in person, either by inviting the other parent into the office or through a school observation, obtaining adult-reported measures is a minimum standard for assessing ADHD or OADT in toddlers and young children. Such measures are not diagnostic, but should be considered in the context of the full evaluation. It should be noted that parent-report checklists result in higher rates of endorsement of ADHD signs than diagnostic interviews, highlighting the importance of more rigorous assessment strategies for diagnostic purposes (Willoughby et al., 2012).

Medical history should include a focus on prenatal exposures to potentially traumatic life events and chemical exposures, including medications, and licit and illicit substances, especially cigarettes and alcohol. Birth history, including medical or salient psychological processes, is an important component of the assessment. Current medications including steroids, which may be used for asthma, albuterol, sleep aids including complementary medicine or over-the-counter agents may play a role in the presentation. Medical events including head injuries, exposure to lead, and or central nervous system impairments all may influence hyperactivity and impulsivity. Children with global developmental delays may come to clinical attention because of signs of ADHD or OADT, and developmental status should be fully assessed, with special attention to speech and social development. Family history of ADHD, substance use, and learning problems, as well as other mental health disorders, all may increase a child's risk of ADHD or OADT. Social and family factors including parenting style, family stressors, traumatic life events, and peer relationships can aid in understanding a child's clinical presentation. Observations of the child's physical appearance, including any dysmorphic features, such as those consistent with fetal alcohol exposure (unusual ear formation, flat philtrum, epicanthal folds, thin vermillion border) or of fragile X (prominent ears, long face) may aid in the assessment. In every evaluation, intentional attention to any stigmata of possible nonaccidental injury is critical to avoid missing signs of maltreatment, which may be associated with a number of mental health problems. Observa-

tion of the parent–child interaction provides valuable information about the strengths of that relationship and opportunities to support effective parenting approaches to challenging child behaviors. Formal observations, such as with the Crowell procedure, may be particularly helpful in this portion of the assessments (Crowell, 2003).

The components of the comprehensive assessment must be compiled and integrated into a clinical formulation focused on the biological, psychological, and social factors that may serve as risk and protective factors for the child and the family system. When the formulation includes ADHD or OADT, a treatment plan that supports a parent's ability to help a child learn to self-regulate is most likely to be effective.

Treatment of Hyperactivity, Impulsivity, and Inattention in Young Children

Recommended first-line treatment for preschool ADHD is parent management training, such as Triple P, the Incredible Years Series, parent–child interaction therapy, Helping the Noncompliant Child, or the New Forrest Program, which focus on broadly defined disruptive behavior problems, including patterns of ADHD (Abikoff et al., 2015; Charach et al., 2012; Funderburk & Eyberg, 2011; Sanders, Baker, & Turner, 2012; Thompson et al., 2009; Webster-Stratton, 2011). Methylphenidate and atomoxetine have been studied, with modest but overall positive outcomes. The limited effect size and risk of adverse effects, both known and unknown, make it clear psychopharmacologic interventions should not be not first line approaches to ADHD in preschoolers (Gleason et al., 2007; Greenhill et al., 2006; Kratochvil et al., 2011).

Interventions for OADT are less well established, although parent management training approaches have been used with good effect in children as young as 24 months. Other approaches that focus on supporting positive parent–child interactions, such as child–parent psychotherapy (Lieberman, Ippen, & Van Horn, 2006), or more behaviorally guided parent management approaches are likely to increase the emotional and behavioral regulation around the child and promote self-regulation and more positive behavioral regulation within the child. Ensuring that a treatment plan focuses beyond the child's diagnosis to include approaches to support parent mental health, reduce family stresses by addressing basic needs, and consider enhancing culturally congruent natural supports are critical interventions for children with ADHD or OADT. It is impossible to overemphasize that the diagnoses of ADHD and OADT should not be considered a rationale for jumping to pharmacological treatment. Developmentally focused treatment planning is necessary to address the needs of these young children effectively.

Summary and Future Steps

An extensive literature describes developmentally inappropriate hyperactivity, impulsivity in very young childen, and in preschoolers, inattentiveness. A substantial literature highlights the stability of these patterns over time, the association with clinically significant impairment, and the ability of the diagnostic criteria to distinguish between children with and without the disorder. Much of the literature's discriminant and predictive validity has focused on children 36 months and above, whereas the data supporting OADT is predominantly continuous measures of hyperactivity and impulsivity, and demonstration that the diagnosis can be made reliably. Future research will clarify the thresholds for diagnosis, with attention to the number of criteria necessary for both ADHD and OADT, the duration required for diagnosis, trajectory of the categorical diagnosis of OADT, optimal assessment approaches, and mediators and moderators of the trajectories of the disorders. Dissemination of effective assessment strategies and universal first-line interventions is critical, so that early identification can produce clinically meaningful outcomes and positively shape a child's developmental trajectory.

REFERENCES

Abikoff, H. B., Thompson, M., Laver-Bradbury, C., Long, N., Forehand, R. L., Miller Brotman, L., et al. (2015). Parent training for preschool ADHD: A randomized controlled trial of specialized and generic programs. *Journal of Child Psychology and Psychiatry, 56*(6), 618–631.

American Academy of Pediatrics (AAP). (2011). Clinical practice guideline for the diagnosis, evaluation, and treatment of attention-deficit/hyperactivity disorder in children and adolescents. *Pediatrics, 128*(5), 1–16.

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

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: Author.

Bendiksen, B., Svensson, E., Aase, H., Reichborn-Kjennerud, T., Friis, S., Myhre, A. M., et al. (2017). Co-occurrence of ODD and CD in preschool children with symptoms of ADHD. *Journal of Attention Disorders, 21*(9), 741–752.

Bufferd, S. J., Dougherty, L. R., Carlson, G. A., & Klein, D. N. (2011). Parent-reported mental health in preschoolers: Findings using a diagnostic interview. *Comprehensive Psychiatry, 52,* 359–369.

Bunte, T., Shoemaker, K., Hessen, D. J., van der Keijden, P. G. M., & Matthys, W. (2014). Stability and change of ODD, CD, and ADHD diagnosis in referred preschool children. *Journal of Abnormal Child Psychology, 42,* 1213–1224.

Cantwell, D. P., & Baker, L. (1991). Association between attention deficit-hyperactivity disorder and learning disorders. *Journal of Learning Disabilities, 24*(2), 88–95.

Carlson, E. A., Jacobvitz, D., & Sroufe, L. A. (1995). A developmental investigation of inattentiveness and hyperactivity. *Child Development, 66*(1), 37–54.

Charach, A., Dahshti, B., Carson, P., Booker, L., Lim, C. G., Lillie, E., et al. (2012). *Attention deficit hyperactivity disorder: Effectiveness of treatment in at-risk preschoolers; long-term effectiveness in all ages; and variability in prevalence, diagnosis, and treatment* (Report No. 12-EHC003-EF). Rockville, MD: Agency for Healthcare Research and Quality.

Crowell, J. A. (2003). Assessment of attachment security in a clinical setting: Observations of parents and children. *Journal of Developmental and Behavioral Pediatrics, 24*(3), 199–204.

DuPaul, G. J., McGoey, K., Eckert, T., & VanBrakle, J. D. (2001). Preschool children with attention-deficit/hyperactivity disorder: Impairments in behavioral, social, and school functioning. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 508–515.

Egger, H. L., & Angold, A. (2006). Common emotional and behavioral disorders in preschool children: presentation, nosology, and epidemiology. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 47*(3–4), 313–337.

Egger, H. L., Kondo, D., & Angold, A. (2006). The epidemiology and diagnostic issues in preschool attention-deficit/hyperactivity disorder: A review. *Infants and Young Children, 19,* 109–122.

Funderburk, B. W., & Eyberg, S. (2011). *Parent–child interaction therapy protocol*. Gainesville, FL: PCIT International.

Gadow, K. D., & Nolan, E. E. (2002). Differences be-

tween preschool children with ODD, ADHD, and ODD+ADHD symptoms. *Journal of Child Psychology and Psychiatry, 43*(2), 191–201.

Galera, C., Cote, S. M., Bouvard, M. P., Pingault, J.-B., Melchior, M., Michel, G., et al. (2012). Early risk factors for hyperactivity–impulsivity and inattention trajectories from age 17 months to 8 years. *Archives of General Psychiatry, 68*(12), 1267–1275.

Gleason, M. M., Egger, H. L., Emslie, G. J., Greenhill, L. L., Kowatch, R. A., Lieberman, A., et al. (2007). Psychopharmacological treatment for very young children: Contexts and guidelines. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*(12), 1532–1572.

Gleason, M. M., Zamfirescu, A., Egger, H. L., Nelson, C. A., III, Fox, N. A., & Zeanah, C. H. (2011). Epidemiology of psychiatric disorders in very young children in a Romanian pediatric setting. *European Child and Adolescent Psychiatry, 20*(10), 527–535.

Greenhill, L., Kollins, S., Abikoff, H., McCracken, J., Riddle, M., Swanson, J., et al. (2006). Efficacy and safety of immediate-release methylphenidate treatment for preschoolers with ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*(11), 1284–1293.

Gudmundsson, O. O., Magnusson, P., Saemundsen, E., Lauth, B., Baldursson, G., Skarphedinsson, G., et al. (2013). Psychiatric disorders in an urban sample of preschool children. *Child and Adolescent Mental Health, 18*(4), 210–217.

Gurevitz, M., Geva, R., Varon, M., & Leitner, Y. (2014). Early markers in infants and toddlers for development of ADHD. *Journal of Attention Disorders, 18*(1), 14–22.

Harvey, E. A., Youngwirth, S. D., Thakar, D. A., & Errazuriz, P. A. (2009). Predicting attention-deficit/hyperactivity disorder and oppositional defiant disorder from preschool diagnostic assessments. *Journal of Consulting and Clinical Psychology, 77*(2), 349–354.

Healey, D. M., Miller, C. J., Castelli, K. L., Marks, D. J., & Halperin, J. M. (2008). The impact of impairment criteria on rates of ADHD diagnoses in preschoolers. *Journal of Abnormal Child Psychology, 36*(5), 771–778.

Humphreys, K. L., Katz, S. J., Lee, S. S., Hammen, C., Brennan, P. A., & Najman, J. M. (2013). The association of ADHD and depression: Mediation by peer problems and parent–child difficulties in two complementary samples. *Journal of Abnormal Psychology, 122*(3), 854–867.

Humphreys, K. L., & Zeanah, C. H. (2015). Deviations from the expectable environment in early childhood and emerging psychopathology. *Neuropsychopharmacology, 40*(1), 154–170.

Kadesjo, B., Kadesjo, C., Hagglof, B., & Gillberg, C. (2001). ADHD in 3–7 year old children. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(9), 1021–1028.

Keenan, K., Shaw, D. S., Walsh, B., Delliquadri, E., &

Giovannelli, J. (1997). DSM-III-R disorders in preschool children from low-income families. *Journal of the American Academy of Child and Adolescent Psychiatry, 36,* 620–627.

Kratochvil, C. J., Vaughan, B. S., Stoner, J. A., Daughton, J. M., Lubberstedt, B. D., Murray, D. W., et al. (2011). A double-blind, placebo-controlled study of atomoxetine in young children with ADHD. *Pediatrics, 127*(4), e862–e868.

Lahey, B. B., & Applegate, B. (2001). Validity of DSM-IV ADHD. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 502–503.

Lahey, B. B., Pelham, W. E., Loney, J., Kipp, H., Ehrhardt, A., Lee, S. S., et al. (2004). Three-year predictive validity of DSM-IV attention deficit hyperactivity disorder in children diagnosed at 4–6 years of age. *American Journal of Psychiatry, 161*(11), 2014–2020.

Lahey, B. B., Pelham, W. E., Loney, J., Lee, S. S., & Willcutt, E. (2005). Instability of DSM-IV subtypes of ADHD from preschool through elementary school. *Archives of General Psychiatry, 62,* 896–902.

Lahey, B. B., Pelham, W. E., Stein, M. A., Loney, J. A. N., Trapani, C., Nugent, K., et al. (1998). Validity of DSM-IV attention-deficit/hyperactivity disorder for younger children. *Journal of the American Academy of Child and Adolescent Psychiatry, 37,* 695–702.

Lavigne, J. V., Gibbons, R. D., Christoffel, K. K., Arend, R., Rosenbaum, D., Binns, H., et al. (1996). Prevalence rates and correlates of psychiatric disorders among preschool children. *Journal of the American Academy of Child and Adolescent Psychiatry, 35,* 205–214.

Lavigne, J. V., Hopkins, J., Gouze, K. R., Bryant, F. B., LeBailly, S. A., Binns, H. J., et al. (2011). Is smoking during pregnancy a risk factor for psychopathology in young children?: A methodological caveat and report on preschoolers. *Journal of Pediatric Psychology, 36*(1), 10–24.

Leblanc, N., Boivin, M., Dionne, G., Brendgen, M., Vitaro, F., Tremblay, R. E., et al. (2008). The development of hyperactive–impulsive behaviors during the preschool years: The predictive validity of parental assessments. *Journal of Abnormal Child Psychology, 36*(7), 977–987.

Lee, S. S., Lahey, B. B., Owens, E. B., & Hinshaw, S. P. (2008). Few preschool boys and girls with ADHD are well-adjusted during adolescence. *Journal of Abnormal Child Psychology, 36*(3), 373–383.

Lieberman, A. F., Ippen, C. G., & Van Horn, P. J. (2006). Child–parent psychotherapy: 6 month follow-up of a randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry, 45,* 913–918.

Lo-Castro, A., D'Agati, E., & Curatolo, P. (2011). ADHD and genetic syndromes. *Brain and Development, 33*(6), 456–461.

Merrell, K. W., & Wolfe, T. M. (1998). The relationship of teacher-rated social skills deficits and ADHD characteristics among kindergarten age children. *Psychology in the Schools, 35*(2), 101–110.

Morales, M. R., Polizzi, C., Sulliotti, G., Mascolino, C., & Perricone, G. (2013). Early precursors of low attention and hyperactivity in moderately and very preterm children at preschool age. *Pediatric Reports, 5*(4), e18.

O'Neill, S., Schneiderman, R. L., Rajendran, K., Marks, D. J., & Halperin, J. M. (2014). Reliable ratings or reading tea leaves: Can parent, teacher, and clinician behavioral ratings of preschoolers predict ADHD at age six? *Journal of Abnormal Child Psychology, 42*(4), 623–634.

Overgaard, K. R., Oerbeck, B., Aase, H., Torgersen, S., Reichborn-Kjennerud, T., & Zeiner, P. (2015). Emotional lability in preschoolers with symptoms of ADHD. *Journal of Attention Disorders.* [Epub ahead of print]

Posner, K., Melvin, G. A., Murray, D. W., Gugga, S. S., Fisher, P., Skrobala, A., et al. (2007). Clinical presentation of attention-deficit/hyperactivity disorder in preschool children: The Preschoolers with Attention-Deficit/Hyperactivity Treatment Study (PATS). *Journal of Child and Adolescent Psychopharmacology, 17*(5), 547–562.

Riddle, M. A., Yershova, K., Lazzaretto, D., Paykina, N., Yenokyan, G., Greenhill, L., et al. (2013). The Preschool Attention-Deficit/Hyperactivity Disorder Treatment Study (PATS) 6-year follow-up. *Journal of the American Academy of Child and Adolescent Psychiatry, 52*(3), 264–278.

Rietveld, M. J. H., Hudziak, J. J., Bartels, M., van Beijsterveldt, C. E. M., & Boomsma, D. I. (2004). Heritability of attention problems in children: Longitudinal results from a study of twins, age 3 to 12. *Journal of Child Psychology and Psychiatry, 45*(3), 577–588.

Rolon-Arroyo, B., Arnold, D. H., & Harvey, E. A. (2014). The predictive utility of conduct disorder symptoms in preschool children: A 3-year follow-up study. *Child Psychiatry and Human Development, 45*(3), 329–337.

Sanders, M. R., Baker, S., & Turner, K. M. T. (2012). A randomized controlled trial evaluating the efficacy of Triple P Online with parents of children with early-onset conduct problems. *Behaviour Research and Therapy, 50*(11), 675–684.

Shelton, T. L., Barkley, R. A., Crosswait, C., Moorehouse, M., Fletcher, K., Barrett, S., et al. (1998). Psychiatric and psychological morbidity as a function of adaptive disability in preschool children with aggressive and hyperactive-impulsive-inattentive behavior. *Journal of Abnormal Child Psychology, 26*(6), 475–494.

Spira, E. G., & Fischel, J. E. (2005). The impact of preschool inattention, hyperactivity, and impulsivity on social and academic development: A review. *Journal of Child Psychology and Psychiatry, 46*(7), 755–773.

Sonuga-Barke, E. J., Dalen, L., Daley, D., & Remington, B. (2002). Are planning, working memory, and

inhibition associated with individual differences in preschool ADHD symptoms? *Developmental Neuropsychology, 21*(3), 255–272.

Sonuga-Barke, E. J., & Halperin, J. M. (2010). Developmental phenotypes and causal pathways in attention deficit/hyperactivity disorder: Potential targets for early intervention? *Journal of Child Psychology and Psychiatry, 51*(4), 368–389.

Tandon, M., Si, X., Belden, A., & Luby, J. (2009). Attention deficit/hyperactivity disorder in preschool children: An investigation of validation based on visual attention performance. *Journal of Child and Adolescent Psychopharmacology, 19*(2), 137–146.

Thompson, M., Laver-Bradbury, C., Ayres, M., Le Poidevin, E., Mead, S., Dodds, C., et al. (2009). A small-scale randomized controlled trial of the revised new Forest Parenting Programme for preschoolers with attention deficit hyperactivity disorder. *European Child and Adolescent Psychiatry, 18*(10), 605–616.

Wallis, D., Russell, H. F., & Muenke, M. (2008). Review: Genetics of attention deficit/hyperactivity disorder. *Journal of Pediatric Psychology, 33*(10), 1085–1099.

Webster-Stratton, C. (2011). Combining parent and child training for young children with ADHD. *Journal of Clinical Child and Adolescent Psychology, 40*(2), 191–203.

Wichstrøm, L., Berg-Nielsen, T. S., Angold, A., Egger, H. L., Solheim, E., & Sveen, T. H. (2012). Prevalence of psychiatric disorders in preschoolers. *Journal of Child Psychology and Psychiatry, 53*(6), 695–705.

Willoughby, M. T., Pek, J., Greenberg, M. T., & Family Life Project Investigators. (2012). Parent-reported attention deficit/hyperactivity symptomatology in preschool-aged children: Factor structure, developmental change, and early risk factors. *Journal of Abnormal Child Psychology, 40*(8), 1301–1312.

Zeanah, C. H., Egger, H. L., Smyke, A. T., Nelson, C. A., Fox, N. A., Marshall, P. J., et al. (2009). Institutional rearing and psychiatric disorders in Romanian preschool children. *American Journal of Psychiatry, 166,* 777–785.

Zero to Three. (2015). *Survey for DC:0–5.* Washington, DC: Author.

Zero to Three. (2016). *Diagnostic classification of mental health and developmental disorders of infancy and early childhood: DC:0–5.* Washington, DC: Author.