CATEGORICAL DIAGNOSIS OF EXTREME HYPERACTIVITY, IMPULSIVITY, AND INATTENTION IN VERY YOUNG CHILDREN

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ABSTRACT: Severe hyperactivity and impulsivity are common reasons for referral to infant mental health services. Past versions of ZERO TO THREE's (1994) diagnostic nosology, the *Diagnostic Classification of Mental and Developmental Disorders in Infancy and Early Childhood* (*DC:0–3*), did not address this clinical issue because it had been addressed in other nosologies. These general diagnostic nosologies describe attention deficit hyperactivity disorder (ADHD), but with little attention to developmentally specific aspects of the diagnosis in very young children. Categorical diagnosis related to hyperactivity and impulsivity in very young children warrants careful review of existing literature. Explicit attention must be paid to ensure that categorical diagnoses serve to describe syndromes that cause significant impairment to the family to allow children and families to access effective supports and ensure that behaviors typical of the developmental level are not described as pathologic. This article reviews proposed diagnostic criteria for ADHD and overactivity disorder of toddlerhood as well as the rationale for the criteria and evidence supporting validity and reliability of the diagnoses in very young children. Clinical implications also are presented.

Keywords: ADHD, early childhood, diagnosis

RESUMEN: La severa hiperactividad e impulsividad son razones comunes para referir a servicios de salud mental infantil. Las versiones anteriores de la nosología de diagnosis Cero a Tres, los Criterios de Diagnosis: 0–3 no se ocuparon de este asunto clínico ya que el mismo había sido considerado en otras nosologías. Estas nosologías generales de diagnosis describen el trastorno ADHD, pero con poca atención, desde el punto de vista del desarrollo, a específicos aspectos de la diagnosis en niños muy pequeños. La diagnosis categórica relacionada con la hiperactividad y la impulsividad en niños muy pequeños demanda una cuidadosa revisión de la literatura existente. Una explícita atención debe ser puesta para asegurar que diagnosis categóricas sirven para describir síndromes que causan impedimentos significativos a familias para permitirles a los niños y sus familias el acceso a un apoyo efectivo y la seguridad de que conductas típicas del nivel de desarrollo no son descritas como patológicas. Este ensayo revisa criterios de diagnosis propuestos para ADHD y OAD, y revisa el razonamiento para esos criterios, la evidencia que apoya la validez y confiabilidad de la diagnosis en niños muy pequeños, y discute las implicaciones clínicas.

Palabras claves: ADHD, temprana niñez, diagnosis

RÉSUMÉ: L'hyperactivité et l'impulsivité graves sont des raisons fréquentes d'envoyer consulter en service de santé mentale de la petite enfance. Les versions précédentes de la nosologie diagnostique Zéro à Trois, le Critère Diagnostique: 0–3, ne se sont pas attachées à ce problème clinique parce que cela avait été fait dans d'autres nosologies. Ces nosologies diagnostiques générales décrivent le trouble d'hyperactivité avec déficit de l'attention (THADA), mais prêtent peu d'attention au diagnostic d'aspects spécifiques au développement chez les très jeunes enfants. Le diagnostic catégorique lié à l'hyperactivité et à l'impulsivité chez les très jeunes enfants justifie un passage en revue attentionné des recherches actuelles. Il faut y accorder une attention explicite afin de s'assurer que les diagnostics catégoriques servent à décrire les syndromes qui causent des problèmes à la famille de façon à permettre aux enfants et aux familles d'accéder à des soutiens efficaces et de s'assurer que les comportements typiques au niveau du développement ne sont pas décrits comme étant pathologiques. Cet article passera en revue les critères de diagnostic proposés pour le THADA et le Trouble Anxieux Généralisé, les justifications du critère, les preuves soutenant la validité et la fiabilité des diagnostics chez les très jeunes enfants, et il discutera les implications cliniques.

Mots clés: trouble d'hyperactivité avec déficit de l'attention (THADA), petite enfance, diagnostic

ZUSAMMENFASSUNG: Starke Hyperaktivität und Impulsivität sind häufige Gründe für eine Überweisung an Dienstleister, die sich mit der psychischen Gesundheit von Säuglingen beschäftigen. Frühere Versionen der Diagnostischen Nosologie DC:0-3 thematisierten dieses klinische Problem nicht, da

es in anderen Nosologien behandelt wurde. Diese allgemeinen diagnostischen Nosologien beschreiben zwar ADHS, allerdings richten sie ihren Fokus wenig auf entwicklungsspezifische Diagnoseaspekte bei sehr jungen Kindern. Die kategorische Diagnose bezüglich Hyperaktivität und Impulsivität bei sehr jungen Kindern benötigt eine sorgfältige Überprüfung der bestehenden Literatur. Es muss besonders darauf geachtet werden, dass kategorische Diagnosen der Beschreibung von Syndromen dienen, die erhebliche Beeinträchtigungen in der Familie verursachen, um somit den Kindern und Familien Zugang zu einer effektiven Unterstützung zu ermöglichen und sicherzustellen, dass Verhaltensweisen, die für die Entwicklungsstufe typisch sind, nicht als pathologisch beschrieben werden. Dieser Artikel überprüft vorgeschlagene diagnostische Kriterien für ADHS und OAD sowie das Rational für die Kriterien und Nachweise für die Validität und Reliabilität der Diagnosen bei sehr jungen Kindern und diskutiert die klinischen Implikationen.

Stichwörter: ADHS, frühe Kindheit, Diagnose

抄録： 重篤な過活動と衝動性は、乳幼児精神保健サービスに紹介される、よくある理由である。Zero to Three 診断分類の以前の版、診断基準: 0-3 は、この臨床的問題を取り上げなかった。なぜなら、それは別の分類で取り上げられてきたからである。これらの一般的な診断分類では、ADHD の障害を記述するが、とても幼い子どもにおける診断の発達的側面には、ほとんど注目していない。非常におさない子どもにおける過活動と衝動性に関連したカテゴリー診断には、既存の文献を注意深くレビューするのが当然である。家族と子どもが効果的な支援につながることができるように、家族にかなりの機能障害をもたらす症候群を記述する上で、カテゴリー診断が役立つことを保証することに、そして発達水準に典型的な行動が病理的と記述されないことを保証することに、明らかな注目が払われるべきである。この論文では、提案された ADHD と OAD の診断基準をレビューし、診断基準の論理的根拠、とても幼い子どもにおける診断の妥当性と信頼性を支持する根拠をレビューし、そして臨床的な意味について考察する。

キーワード： ADHD, 早期児童期, 診断

摘要： 嚴重的多動和衝動是幼兒心理健康服務轉診的常見原因。在從零到三的疾病診斷分類過去的版本中, 診斷標準: 0-3 並沒有處理這個臨床問題, 因為其他疾病分類法已經將它處理。這些一般診斷疾病分類學描述多動症的障礙, 但很少注意診斷非常年幼的兒童發育的的具體方面。現有文獻需要仔細審查非常年幼兒童的多動和衝動的明確診斷。為了讓孩子和其家人得到有力的支持, 並確保典型發展水平的行為不 會被描述為病態, 我們必須明確注意顯著損害家庭之診斷分類。本文評論提出的多動症和強迫症的診斷標準, 並審查準則的理由, 支持診斷有效性和可靠性之證據, 及討論其臨床意義。

關鍵詞： 多動症, 幼兒期, 診斷

الهدف: يعتبرفرط النشاط والاندفاعية من الأسباب الشائعة لتوجيه الرضيع لخدمات الصحة النفسية . ولم تتناول الإصدارات السابقة (من صفر إلى 3) من تصنيفات الأمراض هذا الموضوع حيث تم تضمينه في تصنيفات أخرى . تلك التصنيفات التشخيصية العامة تصف اضطراب فرط نشاط قصور الانتباه (ADHD) ولكن مع عدم التركيز الكافي على جوانب نمو محددة في تشخيص صغار الأطفال . إن التصنيف النوعي المرتبط بفرط النشاط والاندفاعية عند صغار الأطفال يحتاج إلى مراجعة دقيقة للدراسات السابقة . كما يجب توجيه الانتباه المباشر لضمان أن التشخيصات النوعية تعرض وصفا جيدا للأعراض التي تسبب قصورا واضحا للأسرة وذلك حتى نسمح للأطفال والأسر بالحصول على دعم فعال وضمان أن السلوكيات النمطية الناتجة عن مراحل النمو لا يتم اعتبارها مرضية . هذا البحث يتناول المعايير التشخيصية المقترحة لكل من (ADHD و OAD) وأسباب اختيار هذه المعايير وكذلك يقدم دلائل تدعم صدق وثبات التشخيصات عند صغار الأطفال ويناقش المدلولات الاكلينيكية لذلك .

كلمات مفتاحية : ADHD – الطفولة المبكرة - التشخيص

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Severe hyperactivity and impulsivity are among the most common reasons for referral to mental health professionals in early childhood. For the first time, ZERO TO THREE's (in press) diagnostic nosology for young children, the *Diagnostic Classification of Mental and Developmental Disorders in Infancy and Early Childhood* (*DC:0–5*), will address this domain with two diagnoses—attention deficit hyperactivity disorder (ADHD) and its early presentation, overactivity disorder of toddlerhood (OAD)—in the newest iteration.

Past versions of the early childhood *DC* nosology contained only those diagnoses not included or well characterized in the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*; American Psychiatric Association, 2010) or the International Classifica-tion of Diseases (World Health Organization, 2010) nosology. The *DC:0–5* will be more inclusive, offering clinicians the ability to use the nosology to characterize the clinical presentations of very young children, including those with early onset signs of ADHD. This inclusive approach to the *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.

In a recent survey of early childhood mental health clinicians, researchers, and advocates about draft criteria for the *DC* nosology, some respondents stressed that the inclusion of ADHD and OAD must ensure differentiation from typical development (ZERO

TO THREE, 2015). Although this is true of all diagnoses, disorders with criteria that include exacerbations of behavioral patterns characteristic of typical development tend to trigger these concerns more than do disorders whose criteria include behaviors not seen in typical development. However, it also is true that there are notable risks of delaying identification of a well-established neurodevelopmental process for which safe and effective interventions exist. This article presents the proposed diagnostic criteria for ADHD and OAD, reviews the rationale for the criteria and the evidence supporting validity and reliability of the diagnoses in very young children, and discusses the clinical implications.

DRAFT DIAGNOSTIC CRITERIA AND RATIONALE

In the *DC:0–5*, the diagnosis of ADHD focuses on children of at least 36 months. 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. In addition, the syndrome must be persistent, occur in more than one setting or relationship, and cause significant impairment for at least 6 months. Perhaps most important, the clinical signs of ADHD must be excessive as compared to cultural and developmental norms.

OAD describes a syndrome of extreme, developmentally excessive hyperactivity and impulsivity in children 24 to 36 months. The focus is exclusively on hyperactive and impulsive behavioral signs and does not include an inattention cluster. To meet the diagnostic criteria for OAD, 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 draft 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. The *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 draft diagnostic criteria focus on the presentation of 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 to 5 years old, most of the 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 also was present in high rates in both groups. Importantly, endorsement of this pattern of frequent interrupting also was associated with higher level of impairment. The criterion focused on interrupting was retained in the draft criteria of the *DC:0–5* because of the well-established literature demonstrating discriminant and predictive validity even with its inclusion (Lahey & Applegate, 2001; Lahey et al., 2004; Lahey et al., 1998; Lee, Lahey, Owens, & Hinshaw, 2008). Although signs of individual criteria may be observed commonly in the general population, the diagnosis requires six criteria be met and cause impairment, meaning that a single criterion alone does not lower the diagnostic criterion threshold to a degree that has interfered with diagnostic validity and/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 (American Psychiatric Association, 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 epidemiologic studies, 2 to 5.7% of children 3 to 6 years old met 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 (*M* age = 5.0 years) has highlighted the substantial difference in numbers 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 of a possible 18 and had a mean score of 32 on the ADHD Rating Scale, as 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 who were 42 to 66 months old and 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 (≥7), 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 has suggested that this diagnostic threshold provides excellent specificity, and such children may require clinical attention. To avoid the risk of over-pathologizing typical development, the threshold of six criteria is maintained in the *DC:0–5* draft criteria, although further empirical work to explore the most appropriate threshold is warranted.

Age of onset. In the *DC:0–5*, the draft criteria require a child to 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 next, have focused on children over 36 months (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 next.

OAD

Some children under 36 months of age present with extremes of hyperactivity and/or impulsivity. Large epidemiologic studies in the United States and Norway have demonstrated that signs of ADHD can be reliably identified in children as young as 24 to 36 months (Bufferd et al., 2011; Egger & Angold, 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 because there are fewer attentional demands placed on children in most cultures during this developmental period. Thus, it was the consensus of the *DC:0–5* Task Force that the data supporting a clinical diagnosis of inattention in toddlerhood were 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 school age years. In a large Norwegian study, stability coefficients of hyperactivity and impulsivity based on maternal 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 did 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 to 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 and 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 did those with anxiety or with no diagnosis, with an odds ratio of 1.3 to 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 purposes of a categorical nosology, despite the potential gradual onset, a lower limit of age of onset is necessary. In the draft *DC:0–5*, the lower limit is defined as 24 months, with a requirement of at least a 6-month duration of symptoms. This limit was derived because research studies focused on the developmental trajectory of ADHD generally have begun at 18 months, and in the clinical setting, extreme hyperactivity and impulsivity are observable in some young children. 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 is particularly important when applying the diagnosis of OAD.

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 1 year (Kadesjo et al., 2001). In studies employing the Preschool Age Psychiatric Assessment, the syndrome must be 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 24 to 60 months as well as epidemiologic prevalence and stability patterns. In studies that have applied the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*; American Psychiatric Association, 1994) criteria, such as the studies by Lahey et al. (2004;

Lahey et al., 1998), who examined validity, stability, and correlates of early childhood ADHD, a duration of 6 months was required. The *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (*DSM-5*; American Psychiatric Association, 2013) maintained the 6-month duration requirement. 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 that of older children and adolescents. Although it is possible that the 6-month duration will prove overly restrictive with further assessment, the draft diagnostic criteria in the *DC:0–5* currently maintain the 6-month duration.

Two-Setting Criterion

The rationale for requiring that ADHD occur in more than one setting or in 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 the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (American Psychiatric Association, 2000), impairment was required in multiple settings whereas in the *DSM-5* (American Psychiatric Association, 2013), symptoms, but not necessarily impairment, are required in multiple settings. The requirement of multisite impairment has been questioned by some researchers who noted that this requirement was 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, Pelham, Loney, Lee, & Willcutt, 2005). When compared with consensus diagnosis as the gold standard, including the pervasiveness criterion reduced sensitivity of the ADHD diagnosis modestly from 83 to 77% without changing specificity, which was 98% using both (Bunte et al., 2013). However, predictive validity appears stronger when two settings are required. In a longitudinal study, at the 4-year follow-up, preschool-age children with signs of ADHD in only one setting were approximately half as likely to meet the full diagnostic criteria than were 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 the draft *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 the preschoolers who had six or more signs of ADHD did not have impairment on a formal impairment scale examining functioning in seven settings (Healey, Miller, Castlli, Marks, & Halperin, 2008), highlighting the importance of impairment in discriminating a 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, and opportunities to participate in developmentally appropriate activities and/or learning. Impairment often occurs in multiple domains, and 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 of the two, has not been established in preschoolers. Specifically, ADHD in the preschool years is associated with 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 higher rates of special education services (or eligibility for these supports) at higher rates than are those for typically developing children (DuPaul et al., 2001b; Posner et al., 2007). In a U.S. study, 40% of the preschool children with ADHD had been suspended from school at least once (Egger & Angold, 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 (e.g., hyperactive/impulsive type or inattentive type) have proven to have limited predictive validity, although the combined type has been associated with the highest stability over time (Lahey et al., 2005). In a study of preschoolers ages 4 to 6 followed longitudinally for 7 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 the inattentive type or the 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 to 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, & the Family Life Project Investigators, 2012). For these findings that suggest limited value and stability of subtypes in preschoolers, the clinical value of subtypes is limited, although there is potential for further research related to correlates and mediators of stability of different subtype patterns.

VALIDITY OF ADHD AND OAD

Concurrent Validity

Concurrent validity of a diagnosis is demonstrated by associations with predicted clinical factors. As in older children, very preterm birth (≤ 29 weeks) 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 controlling 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 those reported in older children with ADHD, suggesting continuity across ages (as reviewed in AAP, 2011).

Predictive Validity

Predictive validity of ADHD in preschoolers has been examined starting in the preschool years through age 8. 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 et al. (2004; Lahey et al., 2005) reported that 80% of the 114 children met criteria for ADHD 8 years later. Similarly, in another 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 (DISC) 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 to 12 years of age (Riddle et al., 2013). 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 psychopharmacologic 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 to 13 years of age were less likely to be classified as "well adjusted" on measures of anxiety and depression (64 vs. 89%, respectively), social skills (37 vs. 70%, respectively), peer relationships (51 vs. 84%, respectively), and academic achievement (82 vs. 94%, respectively), and have conduct disorder than were peers without ADHD (Lee et al., 2008; Rolon-Arroyo, Arnold, & Harvey, 2014). Preschoolers with ADHD also are at higher risk for learning disorders and academic problems in the school-age period (Cantwell & Baker, 1991). Furthermore, 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 (as reviewed in 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 to ADHD have 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 also may 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, as compared to nonmaltreated preschoolers living in families (Zeanah et al., 2009). Specific caregiving patterns such as intrusive caregiving are similarly associated especially with inattentiveness and hyperactivity (Carlson, Jacobvitz, & Sroufe, 1995). Other noninherited prenatal and postnatal factors also are 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, Pek, Greenberg, & the Family Life Project Investigators, 2012). Findings related to the association between preschool ADHD and prenatal smoking exposure have been mixed, with many, but not all, studies reporting an association (e.g., Lavigne et al., 2011). Perinatal factors, including low birth weight and preterm birth, also predict early hyperactivity and impulsivity (e.g., Galera et al., 2012). In addition, postnatal exposure to lead and central nervous system disorders such as

seizures are associated with higher rates of ADHD. Family factors, including young parental age, parental depression, and isolated family also increase the risk of preschool ADHD (e.g., Galera et al., 2012).

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

DIFFERENTIAL DIAGNOSIS

Especially for very young children, clinicians must consider the differential diagnosis of typical development, a relationship disorder, posttraumatic stress disorder (PTSD), or other Axis 1 disorder before making a diagnosis of ADHD. Typical development may include a high level of symptoms, but generally does not cause substantial impairment. Difficulty meeting inappropriate developmental expectations such as a requirement for children to sit alone at a desk doing "school work" for extended periods of time does not represent a child's individual functional impairment. Relationship disorders may present with relationship-specific symptoms that are not generalized to other relationships. PTSD may cause 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. Sleep disorders that cause sleep deprivation can present with behavioral patterns similar to ADHD, although parents sometimes may 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 considered as an etiologic factor in children with signs of ADHD. Absence seizures may present with signs suggestive of inattention symptoms, but may be distinguished because children having 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 have varied across the literature, but ADHD can be associated with oppositional defiant disorder (ODD) and internalizing disorders, specifically separation anxiety disorder and major depressive disorder (MDD), or with a cluster of ODD, MDD/generalized anxiety disorder (Wichstrøm et al., 2012). In one epidemiologic study, ADHD was associated indirectly with internalizing and externalizing disorders, but only through the associations with disruptive behavior disorders (Egger & Angold, 2006).

CLINICAL ISSUES IN EARLY CHILDHOOD ADHD AND OVERACTIVITY

Clinicians approach the 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 extreme hyperactivity and impulsivity. Clinical assessment of children presenting with hyperactivity, impulsivity, and/or inattentiveness requires a full diagnostic evaluation to confirm the diagnosis of ADHD or OAD, identify comorbid conditions, and 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 of parent–child interactions. The history of the presenting problem should include the timing and the context of onset of the problems. Acute onset or onset associated with specific life events may represent adjustment or trauma-related disorders rather than ADHD or OAD. Similarly, episodic or context-specific patterns are less likely to represent ADHD or OAD 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 OAD in very young children. To reduce reliance on a single reporter, obtaining history from more than one adult is particularly important when considering ADHD or OAD 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 OAD in toddlers and young children. Such measures are not diagnostic but should be considered in the context of the full evaluation. Note that parent-report checklists result in higher rates of endorsement of ADHD signs than do 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 such as 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 such as steroids, which may be used for asthma, albuterol, sleep aids, and complementary medicine or over-the-counter agents may play a role in the presentation. Medical events such as head injuries, exposure to lead, and/or central nervous system impairments may influence hyperactivity and impulsivity. Children with global developmental delays may come to clinical attention because of signs of ADHD or OAD, 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 may increase a child's risk of ADHD or OAD. Social and family factors such as 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 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. Observation 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).

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 OAD, a treatment plan that supports a parent's ability to help a child learn to self-regulate is most likely to be effective. The recommended first line of treatment for preschool ADHD is parent management training such as Triple P, the Incredible Years Series, Parent Child Interaction Therapy, or the New Forrest Program, which focus on broadly defined disruptive behavior problems, including patterns of ADHD (Charach et al., 2012). 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 that 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 OAD are less well established, although the parent management training approaches have been used for 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 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 OAD. It is impossible to overemphasize that the diagnoses of ADHD and OAD should not be considered a rationale for jumping to pharmacologic treatment. Developmentally focused treatment planning is necessary to effectively address the needs of these young children.

SUMMARY AND FUTURE STEPS

An extensive literature has described developmentally inappropriate hyperactivity, impulsivity, in both toddlers and preschoolers, and in preschoolers, inattentiveness. A substantial literature has highlighted 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 focused on discriminant and predictive validity has been in studies of children 36 months and older whereas data supporting OAD has been 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 OAD, the duration required for diagnosis, the trajectory of the categorical diagnosis of OAD, optimal assessment approaches, and mediators and moderators of the trajectories of the disorders. Dissemination of effective assessment strategies and universal first-line interventions are critical so that early identification can produce clinical meaningful outcomes and positively shape a child's developmental trajectory.

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