THE DIAGNOSIS OF ADHD IN ADULTS

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Adult attention deficit hyperactivity disorder (ADHD) in adults is a childhood-onset, persistent, neurobiological disorder associated with high levels of morbidity and dysfunction estimated to afflict up to 5% of adults worldwide. It includes a combination of persistent problems, such as difficulty paying attention, hyperactivity and impulsive behavior, which can lead to unstable relationships, poor work or school performance, low self-esteem, and other problems.

The diagnosis is important to design an effective treatment plan with the patient, which often includes medication and psychotherapy or counselling. There is a wide variety of approaches in the diagnosis of adult ADHD, and this article aims at giving an overview of some of the more common ones.

Awareness for the communication patterns in the interaction with the patient, and how the patient communicates internally, are important tools in the diagnostic process and in treatment, improving the individualization of treatment and building and maintaining compliance. While the actual interaction with the patient is of primary diagnostic importance, standardized questionnaires and neuropsychological testing batteries are important to support a diagnosis and to adjust treatment.

Keywords: attention deficit hyperactivity disorder, ADHD, diagnosis, treatment, psychotherapy, psychiatry

Version 1.0

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Introduction

Adult attention deficit hyperactivity disorder (ADHD) in adults is a childhood-onset, persistent, neurobiological disorder associated with high levels of morbidity and dysfunction estimated to afflict up to 5% of adults worldwide (Kessler et al., 2006). It includes a combination of persistent problems, such as difficulty paying attention, hyperactivity and impulsive behavior, which can lead to unstable relationships, poor work or school performance, low self-esteem, and other problems. Using DSM-IV criteria, in a study by Wilens and colleagues, 93% of ADHD adults had either the predominately inattentive or combined subtypes-indicative of prominent behavioral symptoms of inattention in adults. (Wilens et al., 2009) ADHD often presents as an impairing lifelong condition in adults, yet it is currently underdiagnosed and treated in many European countries, leading to ineffective treatment and higher costs of illness. Instruments for screening and diagnosis of ADHD in adults are available and appropriate treatments exist, although more research is needed in this age group. (Kooij et al., 2010)

The diagnosis of ADHD in adults is a complex procedure which should refer to the diagnostic criteria of a diagnostic manual, such as the DSM or ICD. It normally includes the following information:

- retrospective assessment of childhood ADHD symptoms
- current adult ADHD psychopathology including symptom severity and pervasiveness,
- functional impairment
- quality of life
- comorbidity

In order to obtain a systematic database for the diagnosis and evaluation of the course ADHD rating scales can be very useful. However, the interaction with the patient in the clinical interview should remain the central part of the diagnosis. (Haverkampf, 2017c, 2017a) Integrating elements of semi-structured questioning into the clinical interview can be helpful, while awareness for the communication patterns the patient uses is crucial. (Haverkampf, 2018c) Still, specific diagnostic criteria that are more sensitive and specific to adult functioning are needed. (Davidson, 2008)

Attention

When focusing on the diagnostic details, one may sometimes run the risk of losing sight of the bigger defining symptoms of ADHD. Attention deficit needs to be present for the diagnosis. Studies of adults with ADHD suggest that the most prominent symptoms of ADHD relate to inattention as opposed to hyperactivity and impulsivity. In a meta-analysis, Schoenlein and Engel integrated 24 empirical studies reporting results of at least one of 50 standard neuropsychological tests comparing adult ADHD patients with controls. Complex attention variables and verbal memory discriminated best between ADHD patients and controls. In contrast to results reported in children, executive functions were not generally reduced in adult ADHD patients. (Schoechlin & Engel, 2005)

Executive Functioning

Attention deficit hyperactivity disorder (ADHD) is associated with deficits in executive functioning. ADHD in adults is also associated with impairments in major life activities, particularly occupational functioning. Executive functioning deficits contribute to the impairments in occupational functioning that occur in conjunction with adult ADHD. Barkley and Murphy concluded in their study that ratings of executive functioning in daily life contribute more to such impairments than do executive functioning tests. The investigators hypothesize that one reason could be that each assesses a different level in the hierarchical organization of EF as a meta-construct. (Barkley & Murphy, 2010)

Communication

The exchange of information, internally and externally, is the process that is generally affected and gives rise to several of the observed symptoms. ADHD interferes with effective and helpful communication internally and externally, which causes several of the observed symptoms. (Haverkampf, 2010b) Internal and external communication patterns should thus be observed in diagnosis and worked with as an important focus later in treatment.

From Childhood to Adulthood: Hyperactivity vs Inattention

Prevalence of ADHD in adults declines with age in the general population, although the unclear validity of DSM–IV diagnostic criteria for this condition may have led to reduced prevalence

rates by underestimation of the prevalence of adult ADHD. (Kessler et al., 2006) Symptoms start in early childhood and continue into adulthood. In some cases, ADHD is not recognized or diagnosed until the person is an adult. Adult ADHD symptoms may not be as clear as ADHD symptoms in children. In adults, hyperactivity often decreases, but struggles with impulsiveness, restlessness and difficulty paying attention usually continue. It is mostly these latter symptoms which can interfere significantly with an individual's daily life.

Hyperactive–impulsive symptoms seem to decline more with increasing age, whereas inattentive symptoms of ADHD tend to persist. In a study by Millstein and colleagues, inattentive symptoms were most frequently endorsed in over 90% of ADHD adults. An assessment of current ADHD symptoms showed that 56% of adults had the combined ADHD subtype, 37% the inattentive only subtype, and 2% the hyperactive/impulsive subtype. Whereas females had fewer childhood hyperactive-impulsive symptoms than males, there were no gender differences in their ADHD presentation as adults. This suggests that the vast majority of adults with ADHD present with prominent symptoms of inattention. (Millstein, Wilens, Biederman, & Spencer, 1997) Decision-making is another important cognitive process which seems impaired in adults with ADHD (Mäntylä, Still, Gullberg, & Del Missier, 2012), and which can lead to impairment in several domains in life.

Measurement Problems

The decrease in ADHD symptoms over time may indicate true remission of symptoms, but it may also indicate that the symptom criteria are less robust in older rage groups. Michielsen and colleagues, for example, concluded in their epidemiological study on ADHD in older persons in the Netherlands that ADHD does not fade or disappear in adulthood. (Michielsen et al., 2012)

Symptoms

Many people with ADHD have fewer symptoms as they age, but some adults continue to have major symptoms that interfere with daily functioning also in later stages of life. In adults, the main features of ADHD may include difficulty paying attention, impulsiveness and restlessness. This can make it more difficult to acquire new information, process it together with existing information and communicate with others.

Adults with ADHD may find it difficult to focus and prioritize, leading to missed deadlines and forgotten meetings or social plans. The inability to control impulses can range from impatience waiting in line or driving in traffic to mood swings and outbursts of anger. The difficulties in

persisting with a task is probably a consequence of ineffective information transmission internally.

Adult ADHD symptoms may include:

- Impulsiveness
- Disorganization and problems prioritizing
- Poor time management skills
- Problems focusing on a task
- Trouble multitasking
- Excessive activity or restlessness
- Poor planning
- Low frustration tolerance
- Frequent mood swings
- Problems following through and completing tasks
- Hot temper
- Trouble coping with stress

Diagnosing ADHD

Extensive psychometric studies have provided empirical support for the symptom thresholds used to diagnose ADHD in children, and there is general agreement that ADHD can be reliably diagnosed in children using these formal diagnostic criteria. However, the reliability of the diagnosis of ADHD in adults is less clear. The task would become easier if there were a greater focus on operationalizing internal and external communication patterns, that can be observed, described by the patient or inferred from these observation and descriptions by an experienced therapist. These patterns have been described by the author in for ADHD (Haverkampf, 2017e, 2017a) as well as for several other mental health conditions (Haverkampf, 2010b, 2017d, 2018b). Diagnosis of adult attention-deficit hyperactivity disorder (ADHD) adults is difficult, as neither symptom report nor neuropsychological findings are specific to ADHD. However, the most information can still be gained in the clinical interview if the clinician is receptive to the various levels of information flows and integrates them into the overall assessment.

Subtypes

It is unclear whether the three subtypes recognized in the diagnostic manuals have a different underlying ethology or any other justification to separate them. However, they are frequently

used in clinical practice and offer a rough symptom description which can also be useful for many non-medical questions, such as support in school or disability. The subtypes are:

- ADHD combined type (ADHD-C; both inattentive and hyperactive–impulsive symptoms)
- ADHD predominantly inattentive type (ADHD-I)
- ADHD predominantly hyperactive–impulsive type (ADHD-H)

Assessment

The diagnosis of adult ADHD is a clinical decision-making process, where the emphasis lies on the clinical interview and anything that can support the information gained in it. There are no objective, laboratory-based tests that can establish this diagnosis. (Haavik, Halmøy, Lundervold, & Fasmer, 2010) Given the difficulties with the formal diagnostic criteria for ADHD, determining the diagnosis of ADHD in adults presents different challenges than determining the diagnosis in children (Riccio et al., 2005). There is no single neurobiological or neuropsychological test that can determine a diagnosis of ADHD on an individual basis (Rosler et al., 2006).

In most situations, an ADHD assessment should include a comprehensive clinical interview, as rating scales, an assessment of a broader spectrum of psychiatric and somatic conditions and information from third parties if available.

Communication

How patients exchange meaningful information with themselves and others to get their needs and aspirations met or in response to an interaction or a perception or sensation is of very high diagnostic values in most psychiatric conditions, including especially so also ADHD. Unfortunately, there is often a lack of focus on a patients' internal and external communication, which could be diagnostically helpful in the diagnosis and treatment of ADHD. For example, the effectiveness of ADHD coaching in improving patients' everyday life has been demonstrated. (Kubik, 2010) Since communication is the basic process by which individuals get their needs and aspirations met in everyday life, increasing their quality of life and integrating them into the community, which in itself can have a protective effect, exploring a patient's communication patterns should be a primary goal of an assessment for the severity of ADHD. (Haverkampf, 2017f, 2017e, 2017b)

The clinical interview, and thus the interaction with the patient, is at the center of the diagnosis of ADHD. This may make the process more difficult to operationalize for randomized

controlled studies if they fail to conceptualize information and communication in a clinical interview. A greater elucidation of communication processes has been described as beneficial by the author and several different techniques and approaches suggested. (Haverkampf, 2010a)

The Clinical Interview

A comprehensive clinical interview is one of the most effective methods to make a diagnosis of ADHD (Adler, 2004; Jackson & Farrugia, 1997; Murphy & Adler, 2004; Wilens, Faraone, & Biederman, 2004). Open-ended questions about childhood and adult behaviors can be used to elicit information necessary to diagnose ADHD. Interviews also include questions regarding developmental and medical history, school and work history, psychiatric history, and family history of ADHD and other psychiatric disorders (Barkley, 2006).

The clinical interview also gives inside into the communication the patient uses, internally and externally, and how he or she attends to and processes meaningful information. (Haverkampf, 2010a, 2018a) This is important for the diagnosis and treatment of any mental health condition, but particularly also ADHD. (Haverkampf, 2017a)

Semi-Structured Interviews

Although many clinicians use unstructured interviews to assess adult ADHD, semistructured interviews do exist. One does not necessarily have to choose between either one, but it can be helpful to at least integrate semistructured elements into a clinical interview, which still offers the latitude to explore more freely, which can be important in assessing any comorbidities. Research suggests that semistructured clinical interviews can reliably and accurately be used for determining a diagnosis of ADHD in adults (Epstein & Kollins, 2006).

Comprehensive diagnostic interviews not only evaluate diagnostic criteria, but also assess different psychopathological syndrome scores, functional disability measures, indices of pervasiveness and information about comorbid disorders. Comprehensive procedures include the Brown ADD Diagnostic Form and the Adult Interview by Barkley and Murphy. The Wender Reimherr Interview which follows a diagnostic algorithm different from DSM-IV. The interview contains only items delineated from adult psychopathology and not derived from symptoms originally designed for use in children. (Rösler et al., 2006)

From a communication perspective, the etiology of ADHD consists generally of the same maladaptive communication and information handling patterns, whether in a child or an adult. However, given differences in developmental stages and environmental factors the

symptoms and impairments can be different. Also, the chronicity and entrenchment of a particular patterns, in connection with developmental progress, can influence the phenomenology of the condition. To consider all these factors a certain flexibility and openness in the clinical interview is of paramount importance.

CAADID

The Conners Adult ADHD Diagnostic Interview for DSM-IV (CAADID), for example, assesses for the presence of the ADHD symptoms listed in the DSM-IV and collects information related to history, developmental course, ADHD risk factors, and comorbid psychopathology. Epstein and Kollines examined the test-retest reliability and concurrent validity of the CAADID for DSM-IV in a sample of thirty patients referred to an outpatient clinic. Kappa statistics for individual symptoms of inattention and hyperactivity-impulsivity were in the fair to good range for current report and retrospective childhood report. Kappa values for overall diagnosis, which included all DSM-IV symptoms, were fair for both current (adult) ADHD diagnosis (kappa = .67) and childhood report (kappa = .69). Concurrent validity was demonstrated for adult hyperactive-impulsive symptoms and child inattentive symptoms. (Epstein & Kollins, 2006)

DIVA

Another semi-structured interview is the Diagnostic Interview for ADHD in adults, which has gone through improvement updates. It has been compared to the CAADID and other ADHD severity scales, following the DSM-IV criteria. Ramos-Quiroga and colleagues carried out a transversal study on 40 out-patients with ADHD to check the criteria and concurrent validity of the DIVA 2.0 compared with the CAADID. The DIVA 2.0 interview showed a diagnostic accuracy of 100% when compared with the diagnoses obtained with the CAADID interview. The concurrent validity demonstrated good correlations with three self-reported rating scales: the Wender Utah Rating Scale (WURS), the ADHD-Rating Scale, and Sheehan's Dysfunction Inventory. (Ramos-Quiroga et al., 2016) One advantage of the DIVA is that it is free to use.

Computer-Assisted Diagnosis

Supportive methods in diagnosing ADHD are being explored. Using computerized clinical decision support modules can in higher quality of care with respect to ADHD diagnosis including a prospect for higher quality of ADHD management in children. (Bergman et al., 2009) This is different from using computers for neuropsychological testing, where the patient

interacts with the computer. Computer-assisted diagnosis tools could, for example, provide decision trees that are based on empirical insights. While this can be a valuable support for the clinician, it is important to keep in mind that the interactions with the patient is probably the most important instrument in the assessment of ADHD.

Questionnaires

Questionnaires may be underutilized in clinical practice. They often are easy to administer, score and interpret, while their reliability and validity can be quite high.

- The Connors Adult ADHD Rating Scales (CAARS)
- the Current Symptoms Scales by Barkley and Murphy (CSS)
- the Adult Self Report Scale (ASRS) by Adler et al. and Kessler et al. and
- the Attention Deficit Hyperactivity Disorder—Self Report Scale (ADHD-SR by Rösler et al.)

are **self-report rating** scales focusing mainly on the DSM-IV criteria, although the CAARS and CSS also have other forms.

- The Wender-Utah Rating Scale (WURS) and
- the Childhood Symptoms Scale by Barkley and Murphy

aim at making a **retrospective assessment** of childhood ADHD symptoms.

- The Brown ADD Rating Scale (Brown ADD-RS) and
- the Attention Deficit Hyperactivity Disorder-Other Report Scale (ADHD-OR by Rösler et al.)

are instruments for use by **clinicians** or significant others.

Both self-rating scales and observer report scales quantify the ADHD symptoms by use of a Likert scale mostly ranging from 0 to 3, which makes comparison of follow-up tests easier.

Self-Report Rating Scales

Self-report checklists are commonly used in the assessment of ADHD. In addition to self-report rating scales, rating scales completed by an individual's spouse or significant other can provide useful information in determining the individual's overall life functioning. They are easy to administer, and a number of reliable and valid measures exist. Problems may be bias or

malingering, which are difficult to control for. Distorted memories probably play a negligible role in rating scales that focus on current symptoms, but could become important in those screening for symptoms in childhood and adolescence.

Research has demonstrated that rating scales can accurately reflect the frequency and intensity of symptoms (Wadsworth & Harper, 2007) and, when used retrospectively, are valid indicators of symptomatology (Murphy & Schachar, 2000). Murphy and Schachar (2000) examined the validity of self-reported ratings of current and childhood ADHD symptoms by adults. In one study, participants' ratings of their childhood ADHD symptoms were compared to their parents' ratings of childhood symptoms. In a second study, participants' ratings of their current ADHD symptoms were compared to a significant other's rating of current symptoms. All correlations between self-ratings and parent ratings were significant for inattentive, hyperactive–impulsive, and total ADHD symptoms, as were correlations between self-ratings and significant other ratings.

Belendiuk and colleagues examined in 2007 the concordance of diagnostic measures for ADHD, including self-ratings and collateral versions of both rating scales and semistructured interviews. Results supported the findings of Murphy and Schachar, showing high correlations between self-reports and collateral reports of inattentive and hyperactive–impulsive symptoms. Results also demonstrated high correlations between self-report rating scales and diagnostic interviews. (Belendiuk, Clarke, Chronis, & Raggi, 2007)

Conners's Adult ADHD Rating Scales (CAARS)

The CAARS (Conners, Erhart, & Sparrow, 1999) assesses ADHD symptoms in adults and comprises short, long, and screening self-report and observer rating scale forms. The CAARS produces eight scales, including scales based on DSM-IV criteria and an overall ADHD index. Internal consistency is good, with Cronbach's alpha across age, scales, and forms ranging from .49 to .92 (Conners et al., 1999; Erhardt, Epstein, Connors, Parker, & Sitarenios, 1999). Test–retest reliability (1 month) estimates are high, ranging from .85 to .95 (Conners et al., 1999; Erhardt et al., 1999). The ADHD index produces an overall correct classification rate of 85%, and the sensitivity of the ADHD index has been estimated at 71% and the specificity at 75% (Conners et al., 1999).

Adler and colleagues compared the reliability, validity, and utility in a sample of adults with ADHD and also as an index of clinical improvement during treatment of self- and investigator ratings of ADHD symptoms via the CAARS. They analyzed data from two double-blind, parallel-design studies of 536 adult ADHD patients, randomized to 10-week treatment with atomoxetine or placebo. The CAARS demonstrated good internal consistency and inter-rater reliability, as well as sensitivity to treatment outcome. (Adler et al., 2008)

Taylor and colleagues retrieved 35 validation studies of adult ADHD rating scales and identified 14 separate scales. The majority of studies were of poor quality and reported insufficient detail. Of the 14 scales, the Conners' Adult ADHD Rating scale and the Wender Utah Rating Scale (short version) had more robust psychometric statistics and content validity. (Taylor, Deb, & Unwin, 2011)

Current Symptoms Scale

The Current Symptoms Scale (Barkley & Murphy, 1998) is an 18-item selfreport scale with both a patient version and an informant version. It contains the 18 items from the diagnostic criteria in DSM-IV. Validity has been demonstrated through past findings of significant group differences between ADHD and control adults (Barkley, Murphy, DuPaul, & Bush, 2002). An earlier DSM-III version of the scale correlated significantly with the same scale completed by a parent (r = .75) and by a spouse or intimate partner of the ADHD adult (r = .65; Murphy & Barkley, 1996a).

Adult ADHD Self-Report Scale–version 1.1 (ASRSv1.1)

The ASRS-v1.1 (Adler, Kessler, & Spencer, 2003) is an 18-item measure based on the DSM-IV-TR criteria for ADHD that produces three scale scores. Questions are designed to suit an adult rather than a child, and the language provides a context for symptoms that adults can relate to. Internal consistency estimates are high, and the ASRS-v1.1 has been shown to have high concurrent validity (Adler et al., 2006).

Adler et al conducted a study to validate the pilot Adult ADHD Self-Report Scale (pilot ASRS) versus standard clinician ratings on the ADHD Rating Scale (ADHD RS). Sixty adult ADHD patients took the self-administered ADHD RS and then raters administered the standard ADHD RS. Internal consistency was high for both patient and rater-administered versions. The intra-class correlation coefficients (ICCs) between scales for total scores was also high, as were ICCs for subset symptom scores. There was acceptable agreement for individual items and significant kappa coefficients for all items. The pilot Adult ADHD Self-Report Scale symptom checklist was thus a reliable and valid scale for evaluating ADHD for adults and showed a high internal consistency and high concurrent validity with the rater-administered ADHD RS. (Adler et al., 2006)

Retrospective Assessments

Retrospective assessments collect information to help make a retroactive diagnosis of ADHD.

Wender Utah Rating Scale (WURS)

The WURS (Ward, Wender, & Reimherr, 1993) is based on items from the monograph Minimal Brain Dysfunction in Children (Wender, 1971), which is more detailed than the symptoms listed in the DSM or ICD-10. McCann and colleagues examined the factor structure and discriminant validity of the WURS in adults seeking evaluation for attention-deficit/hyperactivity disorder (ADHD). Three factors (Dysthymia, Oppositional/Defiant Behavior, and School Problems) accounted for 59.4% of the variance. In a stepwise discriminant function analysis, age and childhood school problems emerged as significant variables. The classification procedure correctly classified 64.5% of patients. Among those who did not have ADHD, only 57.5% were correctly classified compared with 72.1% among those with ADHD. The WURS thus appears to be sensitive in detecting ADHD, but it misclassified approximately half of those who do not have ADHD. (McCann, Scheele, Ward, & Roy-Byrne, 2000)

Non-Self Report Assessments

Brown Attention-Deficit Disorder Rating Scale for Adults (Brown ADD-RS)

The Brown ADD-RS (Brown, 1996; Brown & Gammon, 1991) assesses symptoms of ADHD in adults. It was developed before the DSM-IV concept of ADHD was published and focuses more on symptoms of inattention rather than hyperactivity and impulsivity. The scale shows high internal consistency ($\alpha = .96$) and satisfactory validity (M. Weiss, Hechtman, & Weiss, 1999).

ADHD Investigator Symptom Rating Scale (AISRS)

To measure treatment response, the Adult ADHD Investigator Symptom Rating Scale (AISRS) was developed to better capture symptoms of ADHD in adult patients. The AISRS uses a semistructured interview methodology with suggested prompts for each item to improve interrater reliability. (Spencer et al., 2010) The authors analyzed psychometric properties of the AISRS total and AISRS subscales and compared them to the investigator rated version of the CAARS and the Clinical Global Impression-ADHD-Severity Scale using data from a placebo-controlled 6-month clinical trial of once-daily atomoxetine. Results showed that the AISRS and its subscales were robust, valid efficacy measures of ADHD symptoms in adult patients. Its

anchored items and semistructured interview are mentioned as advancements over existing scales. (Spencer et al., 2010)

Neuropsychological Testing

Attention-deficit hyperactivity disorder (ADHD) is a behaviorally defined diagnosis. Despite the fact that neuropsychological tests have typically been used successfully to investigate the functional neuroanatomy of ADHD in neuroimaging research paradigms, these tests have been of surprisingly limited utility in the clinical diagnosis of the disorder. (Koziol & Stevens, 2012) Still, if used discriminatingly and with an understanding for their place in an assessment, neuropsychological testing can play a significant role in the assessment of ADHD. However, one needs to keep in mind that there is no single test or battery of tests that has adequate predictive validity or specificity to make a reliable diagnosis of ADHD. Although there seem to be differences between adults with ADHD and control participants on measures of cognitive functioning, these measures probably have limited predictive value in distinguishing ADHD from other psychiatric or neurological conditions that are associated with similar cognitive impairments (Wadsworth & Harper, 2007).

In adult ADHD, neuropsychological testing is most beneficial when the results are used to support conclusions based on history, rating scales, and analysis of current functioning. Cognitive assessments can be useful in that they can improve the validity of an ADHD assessment and be used in assessing the efficacy of pharmacological and/or psychological interventions (Epstein et al., 2003). Also, many researchers agree that a neuropsychological assessment will be most sensitive to ADHD when the assessment incorporates multiple, overlapping procedures measuring a broad array of attentional and executive functions (Alexander & Stuss, 2000; Cohen, Malloy, & Jenkins, 1998; Woods et al., 2002).

Important functional domains of neuropsychological tests are:

- verbal ability
- figural problem solving
- abstract problem solving
- executive function
- fluency
- simple attention
- sustained attention
- focused attention
- verbal memory
- figural memory

Woods and his colleagues (2002) reviewed the role of neuropsychological evaluation in the diagnosis of adults with ADHD. In their review of 35 studies, the authors found that the majority of the studies demonstrated significant discrepancies between adults with ADHD and normal control participants on at least one measure of executive function (i.e., the ability to assess a task situation, plan a strategy to meet the needs of the situation, implement the plan, make adjustments, and successfully complete the task; Riccio et al., 2005) or attention. Moreover, Woods et al. found that the most prominent and reliable executive function and attention measures that differentiated adults with ADHD were Stroop tasks (Stroop, 1935) and continuous performance tests (CPTs). (The Stroop phenomenon demonstrates that it is difficult to name the ink color of a color word if there is a mismatch between ink color and word. For example, the word GREEN printed in red ink. The CPT measures a person's sustained and selective attention.)

Neuropsychological tests generally have a poor ability to discriminate between patients diagnosed with ADHD and patients not diagnosed with ADHD. Pettersson and colleagues investigated in their study the discriminative validity of neuropsychological tests and diagnostic assessment instruments in diagnosing adult ADHD in a clinical psychiatric population of 108 patients, 60 were diagnosed with ADHD. The Diagnostic Interview for ADHD in adults (DIVA 2.0) and Adult ADHD Self-Report Scale (ASRS) v.1.1 together with eight neuropsychological tests were investigated. All instruments showed poor discriminative ability except for the DIVA, which showed a relatively good ability to discriminate between the groups (sensitivity = 90.0; specificity = 72.9). A logistic regression analysis model with the DIVA and measures of inattention, impulsivity, and activity from continuous performance tests (CPTs) showed a sensitivity of 90.0 and a specificity of 83.3. This means that while the ability to discriminate between patients with and without ADHD is poor, variables from CPT tests can contribute to increasing the specificity by 10% if used in combination with the DIVA. (Pettersson, Söderström, & Nilsson, 2018)

Schoechlin and colleagues conducted a meta-analysis integrating 24 empirical studies reporting results of at least one of 50 standard neuropsychological tests comparing adult ADHD patients with controls. The 50 tests were categorized into the following 10 functional domains: verbal ability, figural problem solving, abstract problem solving, executive function, fluency, simple attention, sustained attention, focused attention, verbal memory, figural memory. For each domain a pooled effect size d' was calculated. Complex attention variables and verbal memory discriminated best between ADHD patients and controls. Effect sizes for these domains were homogeneous and of moderate size (d' between 0.5 and 0.6). In contrast to results reported in children, executive functions were not generally reduced in adult ADHD patients. (Schoechlin & Engel, 2005) Woods et al. (2002), on the other hand, concluded that although a general profile of attentional and executive function impairment is evident in adults with ADHD, expansive impairments in these domains (i.e., impairments on all attention and executive function tasks) is not common. Their review demonstrated inconsistencies in specific instruments across studies, indicating that adults with ADHD may not perform poorly on all attentional measures all the time. This finding is not surprising given the fact that adults

with ADHD often demonstrate sporadic or inconsistent attention, which can be difficult to identify given the structure provided by the one-on-one testing environment (Barkley, 1998).

One popular family of measures for the assessment of attention and executive control is the continuous performance test (CPT). A review of the available research on CPTs reveals that they are quite sensitive to CNS dysfunction. This is both a strength and a limitation of CPTs in that multiple disorders can result in impaired performance on a CPT. The high sensitivity of CPTs is further complicated by the multiple variations of CPTs available, some of which may be more sensitive or demonstrate better specificity to ADHD in adults than others. If CPTs are to be used clinically, further research will be needed to answer the questions raised by this review. (Riccio & Reynolds, 2006).

Several theoretical models suggest that the core deficit of ADHD is a deficiency in response inhibition. While neuropsychological deficits in response inhibition are well documented in ADHD children, research on these deficits in adult ADHD populations is minimal. In a study by Epstein and colleagues, twenty-five adult ADHD patients, 15 anxiety-disordered adult patients, and 30 normal adults completed three neuropsychological tests of response inhibition: the Continuous Performance Test, Posner Visual Orienting Test, and the Stop Signal Task. ADHD adults demonstrated response inhibition performance deficits when compared to both normal adults and anxiety disordered adults only on the Continuous Performance Test. A similar pattern of differences was not observed on the other two neuropsychological tests. Differing results between tasks may be due to differences in test reliability, task parameters, or the targeted area of brain functioning assessed by each test. (Epstein, Johnson, Varia, & Conners, 2001)

Neurobiological Parameters

Abibullaev and colleagues proposed a decision support system in diagnosing ADHD through brain electroencephalographic signals. (Abibullaev & An, 2012) Lenartowicz and Loos concluded that while EEG cannot currently be used as a diagnostic tool, vast developments in analytical and technological tools in its domain anticipate future progress in its utility in the clinical setting. (Lenartowicz & Loo, 2014) However, the overall assessment still requires a clinical decision, which may depend on many factors, including the individual attitude towards the diagnosis held by the therapist.

Malingering

Malingering is an important issue in ADHD diagnosis and is defined as the conscious fabrication or exaggeration of physical or psychological symptoms in the pursuit of a recognizable goal. A diagnosis of ADHD can provide an individual with several benefits, including stimulant medication, disability benefits, tax benefits, and academic accommodations, and such benefits may motivate adults undergoing diagnostic evaluations for ADHD to exaggerate symptomatology on self-report measures and tests of neurocognitive functioning. Musso and colleagues identified and summarize nineteen peer-reviewed, empirical studies published between 2002 and 2011 that investigated malingered ADHD in college students. Few of the measures examined proved useful for detecting malingered ADHD. Most self-report questionnaires were not sensitive to malingering. While there is some variability in the usefulness of neuropsychological test failure, profiles between malingerers and individuals with ADHD were too similar to confidently detect malingered ADHD. Failure of three or more symptom validity tests proved most useful at detecting malingered ADHD. The authors concluded that there is substantial need for measures designed specifically for detecting malingered ADHD simulators are able to produce plausible profiles on most tools used to diagnose ADHD. (Musso & Gouvier, 2014)

Detection of faking can prove difficult with adults in particular, as clinicians often do not have access to a parent or sibling who can attest to prior history of ADHD symptoms or the resources to follow up do not exist. Moreover, adults often lack developmental documentation such as report cards, teacher evaluations, or prior psychological testing reports.

Quinn (2003) examined the issue of malingering by comparing the susceptibility of a self-report ADHD rating scale and a CPT to faking in an undergraduate sample of individuals with and without a diagnosis of ADHD. Results indicated that the CPT showed greater sensitivity to malingering than did the self-report scale and that a CPT can successfully discriminate malingerers from those with a valid diagnosis of ADHD. Given the potential benefits associated with an ADHD diagnosis, clinicians should include a symptom validity measure in their assessment battery. At present, however, there is no demonstrated best practice for this.

Suhr and colleagues utilized archival data from young adults referred for concerns about ADHD, divided into three groups: (1) those who failed a measure of noncredible performance (the Word Memory Test; WMT), (2) those who met diagnostic criteria for ADHD, and (3) controls with psychological symptoms but no ADHD. Results showed a 31% failure rate on the WMT. Those who failed the WMT showed clinical levels of self-reported ADHD symptoms and impaired neuropsychological performance. Neither self-report measures nor neuropsychological tests could distinguish ADHD from psychological controls, with the exception of self-reported current hyperactive/impulsive symptoms and Stroop interference. (Suhr, Hammers, Dobbinsbuckland, Zimak, & Hughes, 2008) These results underscore the effect of noncredible performance on both self-report and cognitive measures in ADHD.

It is difficult to tell how much a greater focus on the communication dynamics in a clinical interview can improve the problems around malingering. However, communication in its diverse synchronous forms is probably much more difficult to consciously influence and 'fake' than a simple task. However, a greater focus on communication patterns and dynamics also requires the skills and experience in the clinician to work with them.

Differential Diagnosis

Diagnosing ADHD in adults requires careful consideration of differential diagnoses, as it can be difficult to differentiate ADHD from a number of other psychiatric conditions (Pary et al., 2002), including major depression, bipolar disorder, generalized anxiety, obsessive–compulsive disorder (OCD), substance abuse or dependence, personality disorders (borderline and antisocial), and learning disabilities (Searight, Burke, & Rottnek, 2000). For example, differential diagnosis of ADHD from mood and conduct disorders may be difficult because of common features such a mood swings, inability to concentrate, memory impairments, restlessness, and irritability (Adler, 2004). Differential diagnosis of learning disabilities can also prove difficult because of the interrelated functional aspects of the disorders that have the common outcome of poor academic functioning (Adler, 2004; Jackson & Farrugia, 1997).

Comorbidity

High rates of comorbidities are also seen in adults with ADHD, with the majority having at least one additional psychiatric disorder. ADHD is associated with a high percentage of comorbid psychiatric disorders in every lifespan. In adulthood between 65–89% of all patients with ADHD suffer from one or more additional psychiatric disorders, above all mood and anxiety disorders, substance use disorders and personality disorders, which complicates the clinical picture in terms of diagnostics, treatment and outcome issues. (Sobanski, 2006) Outcome studies have demonstrated that individuals diagnosed with ADHD in childhood are at risk for developing comorbid conditions, some of which are likely secondary to ADHD-related frustration and failure.

The most frequent comorbid psychopathologies include mood and anxiety disorders, substance use disorders, and personality disorders. (Katzman, Bilkey, Chokka, Fallu, & Klassen, 2017) Biederman and colleagues (1993) found a relatively high incidence of lifetime diagnoses of anxiety disorders (43% to 52%), major depressive disorder (31%), ODD (29%), CD (20%), antisocial personality disorder (12%), and alcohol and drug dependencies (27% and 18%, respectively) in their sample of clinic-referred adults with ADHD. There are strong familial links and neurobiological similarities between ADHD and the various associated psychiatric comorbidities. Comparable rates of comorbidities have been found in men and women with

ADHD, with the exception of men having higher rates of antisocial personality disorder. (Millstein et al., 1997)

With respect to ADHD subtypes in adults, Millstein and colleagues found higher rates of ODD, bipolar disorder, and substance use disorders in patients with the combined type of ADHD than in those with other subtypes and higher rates of ODD, OCD, and PTSD in patients with the hyperactive type than in those with the inattentive type. In their study, Sprafkin and colleagues found that all three subtypes reported more severe comorbid symptoms than did a control group, with the combined group obtaining the highest ratings of comorbid symptom severity. The authors found that the ADHD symptom subtypes in adults are associated with distinct clinical correlates and conclude that the diversity of self-reported psychopathology in adults who meet symptom criteria for ADHD highlights the importance of conducting broad-based evaluations. (Sprafkin, Gadow, Weiss, Schneider, & Nolan, 2007)

Psychosocial Functioning

In addition to comorbid psychiatric disorders, adults with ADHD often complain of psychosocial difficulties, which can manifest in a significantly higher rate of separation and divorce and lower socioeconomic status, poorer past and current global functioning estimates, and higher occurrence of prior academic problems relative to the control group.

Murphy and Barkley (1996a) documented high rates of educational, employment, and marital problems in adults with ADHD. Multiple marriages were more common in the adult ADHD group, and significantly more adults with ADHD had performed poorly, quit, or been fired from a job and had a history of poorer educational performance and more frequent school disciplinary actions against them than did adults without ADHD. Low self-concept and low self-esteem are common secondary characteristics of adults with ADHD, often resulting from problematic educational experiences and interpersonal difficulties (Jackson & Farrugia, 1997). Adults with ADHD often have strong feelings of incompetence, insecurity, and ineffectiveness, and many of these individuals live with a chronic sense of underachievement and frustration (Murphy, 1995).

Conclusion

Variations in communication processes and patterns, both internally and externally, play an important role in the etiology and the symptomatology of ADHD. Unfortunately, there is not enough focus on them in diagnosis and treatment. The author has proposed a theoretical approach and several practical approaches elsewhere (Haverkampf, 2010b, 2017e, 2017d, 2018b) Since the symptoms of ADHD are consequences of maladaptive internal

communication and processing mechanisms of meaningful information, while at the same time there are maladaptive external communication patterns with the world, which lead to the observed difficulties in the personal and professional life of the patient, a greater focus on communication is important.

The use of DSM-IV criteria for ADHD in adults has been criticized. Barkley (1998) suggests that applying current ADHD criteria to adults is not developmentally sensitive. The DSM-IV criteria for ADHD were designed for and selected based on studies with children (Riccio et al., 2005), and validation studies of ADHD criteria in adults have not been conducted (Belendiuk, Clarke, Chronis, & Raggi, 2007). It has thus been suggested that the symptom lists in DSM-IV may be inappropriately worded for adults and that diagnostic thresholds may be too stringent or restrictive when applied to adults (Heiligenstein, Conyers, Berns, & Smith, 1998). The level of impairment caused by ADHD symptoms may also be different between adults and children, and symptoms will likely affect more domains in adults. However, when looked at from a communication perspective, and when focusing on the basic of ADHD, such as the attention deficit, it seems possible to view ADHD as a condition where external and internal communication, including the receptiveness for and decoding of information, is altered in predictable patterns. (Haverkampf, 2017f)

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