Exploration of Neuroprotective Therapy

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ADHD from the perspective of the International Classification of Diseases (ICD-11) and the International Classification of Functioning, Disability and Health (ICF)

Michael Linden*

Research Group Psychosomatic Rehabilitation, Department of Psychosomatic Medicine, Charité University Medicine Berlin, 12200 Berlin, Germany

***Correspondence:** Michael Linden, Research Group Psychosomatic Rehabilitation, Department of Psychosomatic Medicine, Charité University Medicine Berlin, CBF, Hs. IIIA, Hindenburgdamm 30carlos, 12200 Berlin, Germany. michael.linden@charite.de

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Abstract

The diagnosis of attention deficit hyperactivity disorder (ADHD) poses several diagnostic problems, as is widely acknowledged. The name points to two symptoms only, which are unspecific and embedded in many more neuropsychological symptoms. The additional deficits, such as problems with orientation, memory, cognition, emotion, autonomic nervous regulation, and motor dysfunctions, can be more important for patients in their daily lives than attention and hyperactivity. The general term "neurodevelopmental disorder (6A0)" in the International Classification of Diseases (ICD-11) is more appropriate and should be used instead. A further question is, when a dysfunction, such as inattention, becomes a clinical sign. As outlined in the International Classification of Functioning, Disability and Health (ICF), the context and the associated impairment decide on the clinical relevance of dysfunctions. Accordingly, the diagnosis of neurodevelopmental disorders must start with the description of context requirements, then assess capacity restrictions, and finally relate these to neuropsychological deficits. Subdimensions of neurodevelopmental disorders, as listed in ICD-11, are of no additional benefit, as they are comorbid merging syndromes.

Keywords

Neuropsychology, brain dysfunction, minimal cerebral dysfunction (MCD), impairment, disability, organic brain disorder

Spectrum of neurodevelopmental dysfunctions

Attention deficit hyperactivity disorder (ADHD) is a frequent diagnosis not only in childhood and adolescence, but also in adulthood. In the National Comorbidity Survey [1], the ADHD rate was 4.4%.

Examinations of patients in psychiatric outpatient care report about 20% [2]. ADHD poses several diagnostic problems. Firstly, there are high comorbidity rates with other mental disorders. Many cases may therefore be masked by other problems, leading to non-recognition [3–5].

A further diagnostic issue is that patients typically suffer not only from the two core symptoms, "attention deficit" and "hyperactivity", but also a wide range of additional neuropsychological deficits. This is reflected in ADHD scales, such as the Wender-Utah scale, which not only asks for the core symptoms of hyperactivity and impulsivity, but also for anxious-depressive symptoms, protest behavior, immature personality traits, and disorders of social adaptation [6]. Similarly, empirical studies have shown that ADHD patients suffer from impaired executive functions, difficulties in planning and organization, disorders of parallel acoustic and visual stimulus processing, disorders of motor skills, fluidity of movements and coordination, disorders of memory, problems with drive and procrastination, affect control, frustration tolerance, autonomic nervous regulation, vigilance, and sleep [7, 8]. To study the spectrum and prevalence of cerebral dysfunctions in ADHD patients, we used the minimal cerebral dysfunction (MCD) scale [7, 9, 10], a 70-item self-rating of neuropsychological deficits. Counting only moderate and severe ratings to omit minor unspecific complaints, ADHD patients reported in comparison to other psychosomatic patients, as can be expected, significantly more often core symptoms of ADHD such as hyperactivity (35.8% in ADHD patients vs. 13.3% in controls), lack of patience (36.8% vs. 12.2%), restlessness (39.2% vs. 15.4%), problems standing in line (45.8% vs. 19.5%), impulsivity in discussions (26.9% vs. 8.2%), distractibility (47.6% vs. 16.4%), accidental mistakes (55.7% vs. 19.7%), flightiness (61.8% vs. 21.4%). Additionally, ADHD patients complained about an increased rate of emotional problems, such as lack of emotional control (54.2% in ADHD patients vs. 26.2% in controls), affect tenacity (55.7% vs. 30.4%), and nervousness (34.0% vs. 16.0%). Additionally, there were complaints about motor problems, such as difficulties with fine motor skills (25.9% vs. 10.4%). There were problems with orientation, such as difficulties with finding the way in unknown areas of the city (41.5% vs. 20.5%). There were memory problems, such as problems remembering names (46.7% vs. 24.6%), problems with short-term memory (47.2% vs. 16.7%), and problems with word finding (53.3% vs. 21.7%). There were language and cognitive problems, such as dysgrammatism (31.6% vs. 9.8%), problems with language fluency (40.1% vs. 13.8%), problems with sequencing of phone numbers (15.1% vs. 3.5%), and misplacing items (47.6% vs. 15.1%). There were problems with the autonomic nervous regulation, such as noise intolerance (65.6% vs. 40.5%), and lack of vitality (39.2% vs. 19.7%).

In summary, these data, in accordance with similar studies [8], suggest that the term ADHD, which only highlights two symptoms, is not adequate to represent the full problem. These two symptoms are not diagnostically specific, as there are even ADHD cases with and without one or the other [11, 12]. The term may even be misleading as it focuses the attention of clinicians on selected problems while ignoring the full clinical picture.

Neurodevelopmental disorders in ICD-11

In ADHD, no single symptom, risk factor, or cause can explain and fully describe the clinical problem. All signs may be present or not. Also, etiological speculations do not allow for discrimination of a specific illness process [12, 13]. In a meta-analysis of structural and functional alterations of the brain in patients with attention-deficit/hyperactivity disorder, Yu et al. [14] report that studies discuss lower grey matter volume in the bilateral anterior cingulate cortex, in the median cingulate cortex, in the superior frontal gyrus, in the olfactory cortex, in the left precentral gyrus, in the postcentral gyrus, in the left inferior frontal gyrus, in the orbital gyrus, in the left supramarginal gyrus, in the left caudate nucleus, in the left anterior thalamic projections, in the right gyrus rectus, in the corpus callosum, and an increase in the left striatum, in the lenticular nucleus, in the right caudate nucleus, and in the right anterior thalamic projections. Furthermore, malfunctions of the dopamine transporter, the noradrenaline transporter, the D_4 and D_5 dopamine receptors, and the dopamine β-hydroxylase are suspected.

This does not speak of a specific brain alteration. Instead, it is self-evident that in the brain, all areas have their distinct functions. Dysfunctions in the frontal brain cause different problems than dysfunctions of the basal ganglia. A variety of symptoms can emerge depending on the variant of developmental disorder, the type of damage, brain localization, intensity, duration, and age of the individual.

In psychiatry and neuropsychology, the ADHD spectrum of symptoms has traditionally been described under names such as "specific learning and performance deficits" [15], "minimal cerebral dysfunction" [16], "minimal brain dysfunction" [17], "mild organic psychosyndrome" [18], "psychoorganic axis syndrome" [19], "mild cognitive impairment" [20], "organic brain disease" [21], "dementia syndrome" [22].

In the International Classification of Diseases (ICD-11) [23], ADHD is listed under "neurodevelopmental disorders (ICD-11: 6A0)". The definition says: "Neurodevelopmental disorders are behavioral and cognitive disorders that arise during the developmental period that involve significant difficulties in the acquisition and execution of specific intellectual, motor, language, or social functions. Although behavioral and cognitive deficits are present in many mental and behavioral disorders that can arise during the developmental period (e.g., schizophrenia, bipolar disorder), only disorders whose core features are neurodevelopmental are included in this grouping". Subcategories are "disorders of intellectual development (6A00)", "speech or language disorders (6A01)", "autism spectrum disorder (6A02)", "learning disorders (6A03)", "motor coordination disorder (6A04)", "stereotyped movement disorder (6A06)", and "ADHD (6A05)". The definition for ADHD states: "Attention deficit hyperactivity disorder" is characterized by a persistent pattern (at least 6 months) of inattention and/or hyperactivity-impulsivity that has a direct negative impact on academic, occupational, or social functioning. There is evidence of significant inattention and/or hyperactivity-impulsivity symptoms prior to age 12, typically by early to mid-childhood, though some individuals may first come to clinical attention later. The degree of inattention and hyperactivity-impulsivity is outside the limits of normal variation expected for age and level of intellectual functioning. This definition again describes ADHD as a two-symptom disorder. At the same time, all the other syndromes, which are listed under "neurodevelopmental disorders", can occur comorbidly. The conclusion is that the term 6A0 of ICD-11 is the better diagnostic category for this type of neuropsychological spectrum disorder. The subcategories, including ADHD, are too narrow and clinically insufficient, while 6A0 opens the perspective on the full spectrum of MCD.

Context and impairment

A further diagnostic problem is that the presence of symptoms alone is not sufficient to come to valid diagnostic conclusions. The question is, when a complaint or dysfunction becomes a symptom. Attention and activity are dimensional in nature. Inattentiveness or sluggishness do not per se speak for a mental disorder. Everyday nuisances must be distinguished from debilitating symptoms, in order to avoid overdiagnosis [24, 25]. In the above-mentioned survey in psychosomatic patients [9], the prevalence of ADHD was 1% when only severe symptoms were counted. This increased to 14.6% if only moderate to severe complaints were taken into account, and to 49.5% when all were recognized.

A diagnostic approach is to request, firstly, a minimum number of four or five problems which are subjectively experienced as "often" or "very often", and secondly, some reduced quality of social, academic, or occupational functioning [26]. Impairment is an important additional diagnostic criterion [23, 27]. This raises the question, how to define and assess impairment.

This is outlined in the "International Classification of Functioning, Disability, and Health (ICF)" [28]. A general rule is that illness signs must be qualified by capacity limitations and context-related participation restrictions. Every dysfunction can have different meanings for the person, different consequences, and different treatment needs depending on the environmental context. For example, prosopagnosia is no problem if a person does not need to reliably recognize other persons. However, this deficit would be detrimental for a salesperson who must recognize the customers or who must distinguish diverse types of salami at the cold meat counter in the supermarket. Emotional serenity is indispensable for a psychotherapist but irrelevant for a bricklayer. The same is true for other areas in life and, for example,

affects the ability to form meaningful relationships with family and friends. In clinical practice, all neuropsychological deficits must therefore be identified and qualified separately [9, 29].

Following the ICF [28], the diagnostic process starts with (a) the assessment of participation impairment in daily life, followed by (b) the explanation of the bio-psycho-social development of the problem, and finally (c) identification and specification of the causative symptom. This is possible irrespective of existing additional mental disorders. Treatment is guided by impairment rather than the nature or intensity of the symptoms.

Depending on the dysfunction that causes the impairment, different compensatory treatments must be applied and tailored to the individual symptom and participation impairment, while global treatments may be insufficient because of a lack of specificity. This may include improvement of given capacities, which may allow for circumventing disabilities, training of focussed new compensatory skills, and also changes in environmental requirements.

In summary, there is evidence that ADHD is not a single entity, but rather a group of conditions resulting from interactive bio-psycho-social factors [30]. The term ADHD does not adequately reflect the clinical problem and may even lead to misdiagnoses and unspecific and ineffective treatments. The terms "MCD" or "neurodevelopmental disorders" from ICD-11 better cover the multiplicity of signs and problems. They also conform with the fact that all other syndromes, which are listed under "neurodevelopmental disorders", are merging syndromes and regularly occur comorbid, so that the subclassifications should be restricted to special cases only. The ICF concept of context-adjusted qualification of symptoms helps to distinguish between everyday nuisances and clinically relevant symptoms.

Abbreviations

ADHD: attention deficit hyperactivity disorder

ICD-11: International Classification of Diseases

ICF: International Classification of Functioning, Disability, and Health

MCD: minimal cerebral dysfunction

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