

## Chapter 2

# Diagnostic Assessment

### 2.1 Purpose and Method of Diagnostic Assessment

The purpose of the diagnostic phase is to assess whether the ADHD characteristics are being met in accordance with the DSM-IV criteria. The purpose is to determine that the ADHD characteristics:

- Started in childhood
- Are severe enough
- Have been present throughout the patient's life
- Have led to dysfunctioning throughout the patient's life

The diagnosis will not be made or rejected on the basis of the impression someone makes during the diagnostic interview or on the basis of the neuropsychological test. This is because ADHD patients can, as a result of the tension associated with the interview, be temporarily more calm and focused than normally. The medical history will give the definitive answer on whether or not the patient meets the ADHD criteria.

Aside from interviewing the patient, the method for diagnosing adult ADHD consists of, if possible, also interviewing the partner and parents or other relatives of the patient. The diagnosis is based on the medical history taken from patient and partner regarding the current complaints and performance in education, work, and relationship(s). The patient and, if possible, the parents or other relatives are interviewed about the complaints and performance during childhood.

### 2.2 Screening

People in the Netherlands who would like to know whether they have ADHD symptoms or whether they might meet the criteria for the diagnosis can fill out an extensive screening list online ([www.psyq.nl](http://www.psyq.nl)) and then receive a result on whether or not they have “a chance of ADHD.” This screening list (self-report questionnaire on

attention problems and hyperactivity) is used in epidemiological and clinical research in the Netherlands, and it has been included as an appendix in this book (Kooij et al. 2004, 2005). In research, the validity of the self-report questionnaire turned out to be similar to the two most used American screening lists, the Conners Adult ADHD Rating Scale (CAARS) and the Brown Attention-Deficit Disorder Scale (BADDs) (Kooij et al. 2008). There are short and long versions and versions of the CAARS for patients and relatives, which measure, among other things, DSM-IV criteria (Conners et al. 1999). The BADDs does not measure DSM-IV criteria; it focuses more on executive functions in the areas of attention and organizational problems. One disadvantage is the absence of items for hyperactivity/impulsivity (Brown 1996). Furthermore, there is the Adult ADHD Self-Report Screener (ASRSv1.1) with six items, developed by the World Health Organization (WHO), increasingly validated and available online in various languages ([www.hcp.med.harvard.edu/ncs/asrs.php](http://www.hcp.med.harvard.edu/ncs/asrs.php)) (Adler et al. 2006; Kessler et al. 2007). Russell Barkley is developing a new nine-item screening instrument for adult ADHD, based on executive functioning disorders for adults with ADHD, which will also be validated further (Barkley et al. 2007).

A screening instrument can be very useful when ADHD is suspected and when more information is needed quickly regarding the usefulness of further testing. A screening is however not a diagnostic tool; therefore, it is always advisable to perform further tests if there is a chance of ADHD.

General practitioners and other health workers who want to examine a patient briefly and in a focused way for ADHD core symptoms could ask the following four questions:

### 2.2.1 *Ultrashort Screening List for ADHD in Adults*

1. Do you usually feel restless?  
(for example: nervous, difficulty sitting still, fidgeting, a lot of exercising, or being active)  
Yes/no
2. Do you usually act first and then think?  
(for example: blurting things out, spending too much money, or being impatient)  
Yes/no
3. Do you usually have concentration problems?  
(for example: being easily distracted, not finishing things, being easily bored, forgetful, or chaotic)  
Yes/no  
*If the answer to questions 1 and/or 2 and/or 3 is yes:*
4. Have you always had this? (as long as you can remember or have you been like this most of your life)  
Yes/no  
*If the answer to question 4 is yes, then please consider further diagnostic assessment for ADHD.*

This questionnaire has not been validated in research, but it does use the DSM-IV requirements that can fit the diagnosis: the three core symptoms of restlessness or hyperactivity, impulsivity, and concentration or attention problems are being asked about. A symptom should not be there just once in a while, but it should be present generally, and if it is present, it should have been there since childhood. All three ADHD subtypes are being asked about with these four questions. The questionnaire indicates that the essence of ADHD is not so much the presence of one or more symptoms, but the chronicity of it (always had it/always been like this).

The essence of ADHD is not so much the presence of one or more symptoms, but the chronicity of them.

A further diagnostic assessment of ADHD can be performed with the self-report questionnaire for attention problems and hyperactivity for childhood and adulthood (see Appendix A.2) and/or the diagnostic interview for ADHD (DIVA) (see Appendix A.3).

### 2.2.2 *Diagnostic Assessment*

The diagnostic assessment is performed using the structured diagnostic interview for ADHD (DIVA) (Kooij and Francken 2007) (see also Sect. 3.3 and Appendix A.3). This interview, which replaces the semi-structured interview from the previous edition of this book, combines questions about lifelong ADHD symptoms with the assessment of the number of DSM-IV criteria. Research has shown that adolescents do not recognize themselves in the wording of ADHD symptoms for children in the DSM-IV, which leads to underreporting and underdiagnosis (Barkley 1997a). This phenomenon has also often been seen in clinical practice with adults. This is why concrete examples are given for each DSM-IV criterion for both childhood and adulthood. It makes it easier for patients and family to recognize symptoms that occur in different life phases. Just like Conners Adult ADHD Diagnostic Interview for DSM-IV (CAADID), the DIVA is based on the DSM-IV criteria in adulthood and childhood (Epstein et al. 2001; Epstein and Kollins 2006). As a result, the structure of the DIVA is similar to that of the CAADID. The examples of each criterion in both life phases and the extensive discussion of dysfunctioning in five life areas, also accompanied by concrete examples, are however different from the CAADID. The validity of the DIVA has not yet been studied. The DIVA will be translated into different languages. The translations will be available online at [www.divacenter.eu](http://www.divacenter.eu). If the ADHD diagnosis is made, further assessment of potential comorbidity and treatment advice will follow.

### 2.3 DSM-IV Criteria

According to the DSM-IV-TR (APA 2000), the following are required for the ADHD diagnosis to be made:

- Onset of some symptoms – so not necessarily all – before the age of 7.
- During childhood, six out of nine attention problems *and/or* six out of nine hyperactive/impulsive characteristics were met. This *and/or* means that there are three possible ADHD subtypes: with six out of nine characteristics of attention deficit only, with six out of nine characteristics of hyperactivity/impulsivity only, and with six out of nine characteristics of both attention deficit and hyperactivity/impulsivity.
- Presence of impairment at school and at home.
- Presence of a continuous persistent pattern of symptoms and dysfunctioning up until now. The DSM-IV does not make a statement about the exact number of criteria for adults.

See Table 2.1 for exact phrasing of the DSM-IV ADHD criteria.

**Table 2.1** DSM-IV criteria of attention-deficit disorder with hyperactivity (ADHD) (APA 1994)  
Attention-deficit and disruptive behaviour disorders

|        |   |
|--------|---|
| 314.xx | <b>Attention-Deficit/Hyperactivity Disorder</b>   |
| A.     | Either (1) or (2):  |
| (1)    | Six (or more) of the following symptoms of <b>inattention</b> have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:<br><i>Inattention</i> <ul style="list-style-type: none"><li>(a) Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities</li><li>(b) Often has difficulty sustaining attention on tasks or play activities</li><li>(c) Often does not seem to listen when spoken to directly</li><li>(d) Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)</li><li>(e) Often has trouble organising tasks and activities</li><li>(f) Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)</li><li>(g) Often loses things needed for tasks and activities (e.g. toys, school assignments, pencils, books, or tools)</li><li>(h) Is often easily distracted by extraneous stimuli</li><li>(i) Is often forgetful in daily activities</li></ul> |
| (2)    | Six (or more) of the following symptoms of <b>hyperactivity-impulsivity</b> have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:<br><i>Hyperactivity</i> <ul style="list-style-type: none"><li>(a) Often fidgets with hands or feet or squirms in seat.</li><li>(b) Often leaves seat in classroom or other situations in which remaining seated is expected</li></ul>   |

**Table 2.1** (continued)**Attention-deficit and disruptive behaviour disorders**

- (c) Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to feelings of restlessness)
- (d) Often has difficulty playing or engaging in leisure activities quietly
- (e) Is often “on the go” or often acts as if “driven by a motor.”
- (f) Often talks excessively.

*Impulsivity*

- (g) Often blurts out answers before questions have been finished
  - (h) Often has trouble waiting one’s turn
  - (i) Often interrupts or intrudes on others (e.g., butts into conversations or games)
- B. Some hyperactive-impulsive or inattentive symptoms that cause impairment were present before age 7 years.
- C. Some impairment from the symptoms is present in two or more settings (e.g. at school/work and at home).
- D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.
- E. The symptoms do not occur exclusively during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder, and are not better accounted for by another mental disorder (e.g. Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder).

Based on these criteria, three types of ADHD are identified:

**314.01 ADHD, Combined Type (F90.0):** if both criteria A1 and A2 are met for the past 6 months.

**314.00 ADHD, Predominantly Inattentive Type (F98.8):** if criterion A1 is met but criterion A2 is not met for the past 6 months.

**314.01 ADHD, Predominantly Hyperactive-Impulsive Type (F90.0):** if criterion A2 is met but Criterion A1 is not met for the past 6 months.

**CODing instructions:** For people (in particular adolescents and adults) who currently have symptoms which no longer meet the full criteria, ‘In partial remission’ should be specified.

**314.9 ADHD, Not Otherwise Specified (F90.9)**

This category is used for disorders with prominent symptoms of inattention or hyperactivity-impulsivity that do not meet the criteria of an Attention deficit disorder with hyperactivity.

## 2.4 Subtypes of ADHD

Three subtypes of ADHD are distinguished:

- A. **ADHD, combined subtype.** This is ADHD with all three symptoms: attention deficit, hyperactivity, and impulsive behavior. This combination is seen most frequently in clinical populations. Attention problems and impulsive behavior seem to change the least over time. The hyperactivity can be immediately apparent, but it can also have decreased or become more manageable. Many patients in whom hyperactivity is not immediately apparent still experience continuous inner restlessness or agitation. The unrest can often be fought off temporarily through intensive sports activities.

- B. *ADHD, predominantly inattentive type*. This is ADHD with attention problems only, also called attention-deficit disorder (ADD) or the inattentive subtype. These are dreamy, often introverted adults, who are distracted, slow, often rigid and doubtful, sometimes perfectionist and compulsive, and easily distracted; they suffer from a fear of failure and panic easily when they lose oversight. They are not overactive or impulsive. There are indications that ADD occurs more in girls. These patients have the least chance of being diagnosed as a child. Intelligent ADD patients can compensate for their attention problems for a long time. After all, intelligent people do not have to read or study as long for knowledge to be absorbed, which means they do not need to use their ability to concentrate as much. Only when the level and pace of work or study increases, for instance, in a college or university education, do they have to sit still for longer and become more focused on their studying. It seems that only then, their concentration problems lead to a clear dysfunctioning. Very often, the structure that was provided by the parental home also disappears at that time, which suddenly reveals the problems that were already there.

Often, the attention problems appear to be absent during the diagnostic interview. It is assumed that this is related to the stress associated with such an interview. It is known that stress or arousal can temporarily improve concentration. “Sensation seeking” in AD(H)D patients could be explained as generating a type of arousal, which makes the symptoms decrease.

- C. *ADHD, predominantly hyperactive/impulsive type* – ADHD with only hyperactivity/impulsivity. These are overactive, impulsive people without attention problems. This group occurs the least clinically and was first introduced in the DSM-IV. There are still few data on the validity of this subtype. There is potential overlap with the oppositional and antisocial behavioral disorder. However, in epidemiological research, this subtype is most prevalent in adult populations (Murphy and Barkley 1996; Kooij et al. 2005).

A high IQ or university degree does not rule out AD(H)D. However, attention problems can be obscured for longer by a high intelligence.

### 2.4.1 Prevalence of Subtypes

The combined type occurs in 82 % of a clinical adult population ( $n=141$ ), ADD or the inattentive subtype in 11 %, and the hyperactive/impulsive subtype in a small minority (Kooij et al. 2001a). In children, the combined subtype is also most prevalent in clinical populations (Lahey et al. 1994). In epidemiological populations, the ratios are different. In children, the inattentive subtype occurs most in epidemiological research (Buitelaar 2002). It is possible that in clinical populations, children with the inattentive subtype are underrepresented, because they are not recognized as easily. A lot of times, parents will ask for help for their overactive, difficult

children more quickly than parents with dreamy children with just attention problems. In epidemiological research in adults, the hyperactive/impulsive type is most prevalent (Kooij et al. 2005; Murphy and Barkley 1996).

## 2.5 Age of Onset of ADHD

The DSM-IV states that ADHD starts at a young age, with an onset of *some* symptoms before the age of 7. In childhood, between the ages of 0 and 12, six out of nine characteristics of the attention-deficit domain and/or the hyperactivity/impulsivity domain or both symptom domains have to occur. The criterion for the onset of some symptoms before the age of 7 was set by researchers at the time to include the most serious/clearest cases of ADHD in children in research. Hyperactivity in particular starts early. Attention problems usually only show later, when school and homework make greater demands on a child's focus. This does not mean that the attention problems were not there before.

The problem is that the onset of ADHD before the age of 7 has never been researched as a criterion for the reliability of the diagnosis. Recent studies show that children with an onset before and children with an onset after the age of 7 are no different as regards the severity of the symptoms, dysfunctioning, or comorbidity (Barkley 1997b; Applegate et al. 1997).

The conclusion based on research is that the DSM-IV criterion of "some symptoms present before the age of 7" is too strict (Faraone et al. 2006). For adults, in whom the diagnosis has to be made retrospectively, the criterion leads to underdiagnosing as a result of memory problems. It was therefore suggested that the concept of an onset during primary school age, 6–12 years, rather than an onset before the age of 7 be adopted and that the criterion be dropped in the next DSM version (Barkley and Biederman 1997) (Also refer to Sect. 1.3.1).

## 2.6 Cutoff Point for DSM-IV Criteria in Children and Adults

The DSM-IV criteria were developed for children aged 4–16, not for adolescents and adults. This becomes immediately apparent from the description of, for example, hyperactivity such as "climbs in trees" or attention deficit such as "strongly dislikes school or homework." Furthermore, the criteria are developed to have parents and teachers report on children, and they are not for self-reporting by adults. These differences make the use of the criteria in adulthood less clear. In the DSM-IV, the cutoff point for ADHD symptoms in childhood is at six out of nine characteristics for attention deficit or hyperactivity/impulsivity or both. For adolescence and adulthood, there is no clear cutoff point; it is however stated that there can be fewer than six symptoms and that the diagnosis "ADHD, in partial remission" can be made.

In the use of DSM-IV criteria for children, research shows underreporting of the symptoms by adolescents and adults. Barkley calculated that, with a cutoff point of

six symptoms in adults, only the 1 % of ADHD patients with the most serious symptoms receive the diagnosis (Barkley 1997a).

Adults recognize themselves less in the description of symptoms from the DSM-IV, which are phrased for children. This means that they can meet fewer characteristics. Hyperactivity in adults is, for example, more often experienced as inner restlessness compared to hyperactivity in children. Attention problems tend to be most persistent and cause the greatest number of complaints in adults (Biederman et al. 2000). Epidemiological research in adults confirmed that a cutoff point of four out of nine current characteristics is associated with a significantly greater dysfunctioning than lower symptom levels (Kooij et al. 2005). This was true for young and old, for men and women, and for both hyperactivity/impulsivity and attention problems. Even after a check for dysfunctioning as a result of, for instance, comorbid fear or depression, the cutoff point of four ADHD symptoms continued to correlate significantly with dysfunctioning. Other researchers have, awaiting new age-referenced criteria for ADHD in adults, argued for a lower cutoff point for adults in using the DSM-IV criteria (Murphy and Barkley 1996). Their advice is to maintain the cutoff point for establishing childhood ADHD at six out of nine characteristics of either attention deficit or hyperactivity/impulsivity or both. For the current symptoms in adulthood, a cutoff point of four out of nine DSM-IV characteristics appears to be most appropriate.

## 2.7 ADHD and Intelligence

ADHD occurs in people with low, normal, and high intelligence (Antshel et al. 2008, 2006). In a large population study in 5-year-old twins, IQ and ADHD symptoms were measured. The diagnosis ADHD had a negative correlation with IQ, and the IQ of ADHD children was on average 9 points lower than the IQ of children in the control group. This relation had common genetic backgrounds, which need to be researched further (Kuntsi et al. 2004).

Relatively little research has been done into similarities and differences between people with ADHD with different levels of intelligence. Another problem is that the DSM-IV criteria offer no insight into the use of ADHD criteria in people with a low or high IQ. In the diagnostic assessment symptoms of ADHD, patients need to be contrasted with those of people of the same age with the same level of development, for instance, classmates. In mentally impaired children, the cognitive abilities are not similar to those of classmates or peers, making it more difficult to establish the presence of attention problems. For that reason, in low intelligence, the focus is more on atypical hyperactive and impulsive behavior. Hyperactivity is one of the main reasons for referral to mental health-care services in children with mental retardation. Prevalences of 42 % ADHD are reported in clinical populations (Hardan and Sahl 1997). In a large study among children with low intelligence in special education, 15 % were found to have ADHD (Dekker and Koot 2003). In patients with mental impairments, various hereditary syndromes occur that are associated



with hyperactive behavior, such as neurofibromatosis, the Angelman syndrome, fragile X syndrome, Noonan syndrome, velocardiofacial syndrome, and William syndrome (Simonoff 2007). However, these hereditary syndromes only contribute in small measure to the hyperactivity of children with a low IQ. Furthermore, there is overlap with autism and epilepsy in low intelligence. Just like with ADHD children with an average IQ, there is a greater occurrence of comorbidity than normal, mainly behavioral disorders (Dekker and Koot 2003). In two-thirds, the hyperactivity persists in follow-up studies. These ADHD children were more often institutionalized and sent away from school, and they more often had problems with police/the law (Aman et al. 2002).

Diagnostic assessment in people with low intelligence should go hand in hand with information from parents and teachers, physical and lab examinations, and the use of questionnaires for ADHD and other disorders. Unfortunately, there are no validated instruments for use in lower intelligence levels. Treatment with stimulant drugs in children with low IQ and ADHD is effective, but less so than in ADHD children with a normal or higher intelligence. This can be related to the fact that children with lower intelligence are less capable of indicating what they experience, and therefore, the evaluation of effectiveness is dependent on the people around them. Furthermore, other problems, such as less reliable diagnostic assessments, can play a role, as well as comorbidity factors (Aman et al. 2002, 2003). Another possible explanation is too low dosage of the stimulant drug (Simonoff 2007). A lot of research is therefore needed in people with a mental impairment and ADHD.

Even though high intelligence is generally an advantage, it does not prevent dysfunctioning in ADHD. Research showed that people with high intelligence and ADHD had more speeding tickets, more accidents and arrests, more problems functioning at work and in relationships, and a lower quality of life than people with high intelligence without ADHD. They also suffered from more anxiety and compulsive complaints and depression. ADHD was also more prevalent in the family. Their profile was therefore very similar to that of people with normal intelligence and ADHD (Antshel et al. 2008). One problem in diagnosing people with high intelligence and ADHD can be that patients and the people around them feel that there is no dysfunctioning because they perform better than average. However, this does not always mean that the patient performs at their own intelligence level. Often, because patients function below their own level, they become exhausted, and they only manage to continue to do their work through willpower and working too many hours. The work can also lack challenges. ADHD patients with high intelligence cannot stop themselves from having difficulty sustaining their attention on tasks and from having problems with their chaotic way of organizing and the fact that they need a lot of time to complete tasks. All of this does not match their level of intelligence and leads to underachievement.

Some people claim that a high IQ alone will lead to problems similar to those associated with ADHD. This statement has, as far as is known, not been supported by research. Even though one can imagine that understimulation of gifted children in school can lead to boredom and behavioral problems, it is hard to imagine that adults with high intelligence and without any disorders cannot not develop freely.

## 2.8 Dysfunctioning in ADHD

What is dysfunctioning in ADHD? It is important that the researcher knows about the typical problems that ADHD patients may face. Dysfunctioning in adults with ADHD is expressed in:

- Being educated below the intellectual level or not having finished an education
- Underachievement in work (below the educational level) (see Sect. 2.9)
- Continuously changing jobs or positions as a result of conflicts or being easily bored
- Having relationship problems as a result of not sticking to agreements, not taking enough responsibility, irritability or the need for variety, and easily giving in to infatuations (see Sect. 2.9.3)
- Social problems or social isolation as a result of fear of failure, social fear, shame as a result of failure, and poorly developed social skills
- Inability to organize daily life, keep finances, and housework under control
- More accidents and speeding violations (see Sect. 2.8.1)
- More teen pregnancies
- Earlier onset of alcohol and drug abuse

Often, a lapse in functioning occurs twice in relation to the level of intelligence: once in underachieving at school with, as a result, a lower level of education and the second time when underachieving at work, not being promoted as a result of organizational or concentration problems or conflicts. The result is that patients often end up in a work environment in which they do not truly feel at home and cannot develop properly.

Some patients believe that they are not dysfunctioning, while careful research does bring this to light. One reason for this can be that they have adapted their life to their disorder, for instance, their partner does the paperwork and maintains contacts. They perform easier work than that for which they have been educated, or there is a lot of variety and room to move at work, which makes the restlessness manageable. Intelligence can also offer some compensation. Because of high intelligence, the concentration on tasks need only be short. The question then is whether someone functions at their own level and whether or not they are content with this. Often, difficult situations are avoided, and this takes its toll. The patient is used to the current level of functioning and does not know how it could be done differently. Because of this, when only the patient report is looked at, the conclusion that there is no dysfunctioning might be wrongfully drawn. Establishing dysfunctioning therefore requires some further questioning, often with help from the partner.

### 2.8.1 ADHD and Driving

ADHD can lead to some dangerous situations on the roads. This becomes apparent from American research in which adolescents with ADHD turn out to have 4–5 times as many accidents, compared to normal controls, more speeding violations, and revocations of driver's licenses (Barkley and Cox 2007; Barkley et al. 1993,

1996; Cox et al. 2006). Adults with ADHD also turned out to have had more accidents than normal controls. Recent research with a simulation driving test showed that ADHD patients had a greater chance of an accident than normal controls, especially in the mornings. ADHD patients become tired more quickly while driving than normal groups. This effect can be exacerbated by the sustained attention on monotonous visual tasks in long drives (Reimer et al. 2007).

There is a correlation between ADHD characteristics and research results: ADHD patients, because they are easily distracted, do not have the same amount of oversight. They are, for instance, distracted by every billboard (or by everything that moves). Their sensation-seeking tendencies mean that they will quickly overtake, where someone else would not even think of doing this. ADHD patients themselves indicate that they often are “speed maniacs” and that this behavior increases their level of attention and concentration. Creating arousal or excitement can indeed increase concentration. Another ADHD symptom is impatience, being unable to await your turn, which can, for instance, be a problem in slow traffic. It can lead to tailgating and other annoying road behaviors. Finally, the attention problems and a lack of overview often cause people to not anticipate traffic situations in time, causing them to swerve at the last moment to avoid accidents. Regulations for driving tests in case of ADHD or the use of medication for ADHD may differ per country. It may be useful in the future to identify high-risk groups in the ADHD population and to advise patients on the use of medication in order to prevent accidents.

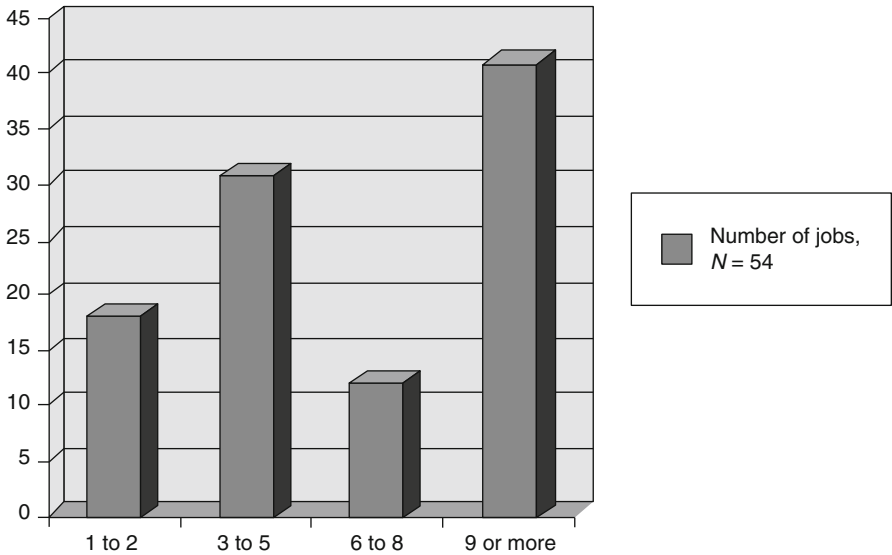
## 2.9 Impact of ADHD on Work, Relationships, and Family

### 2.9.1 ADHD and Work: A Jack-of-All-Trades and Master of None

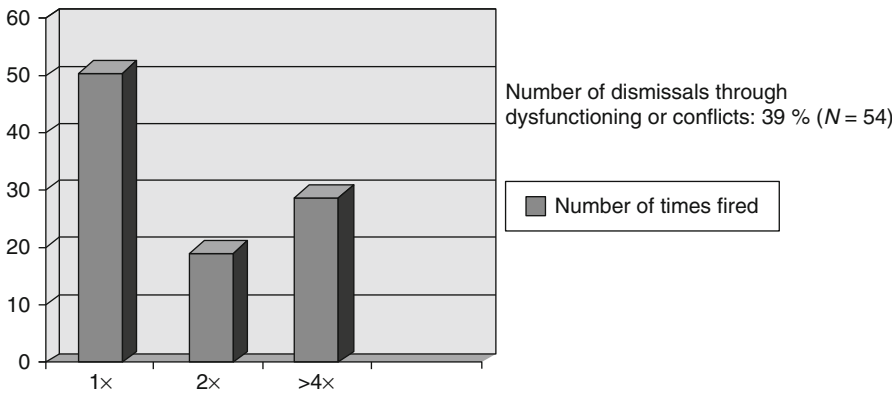
Because of the continuous effect of unrest, distractibility, and concentration problems in performance at school, vocational programs, university education, and work, people with ADHD often do not reach their full potential. They are capable, but they just do not manage it. After their education, which they may or may not finish, they often try to find their way by taking courses or changing jobs. Finding the right place or direction often results in a pattern of “a jack-of-all-trades and master of none.”

Dutch research among 54 adults with ADHD, aged 18–56, showed that on average, they had worked for 15 years. Twenty-seven percent received benefits: 20 % were on long-term sick leave, and 7 % on unemployment benefits. Half of them were easily bored with a job or place of work. The *shortest job* or position lasted less than 6 months in 60 % of people and less than 1 year in 70 %. The *longest job* or position lasted less than 5 years in 50 %. Over 40 % had had more than nine jobs or positions (see Table 2.2). Apart from being easily bored with a job or position, conflicts or dysfunctioning was also often a reason for a change of workplace. Almost 40 % had been fired once, and here, it was notable that this had happened more than four times in almost one-third (Table 2.3). More than 50 % had quit their job, and of these, more than one-fifth had done this more than four times (Table 2.4).

**Table 2.2** Number of jobs



**Table 2.3** Number of times fired

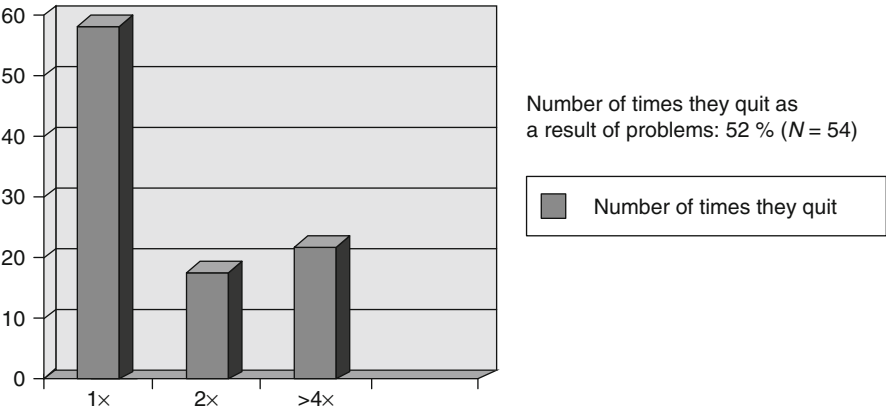


Furthermore, it appeared that roughly half were working below their level of education (a). This study again confirms the early onset of underachievement in the form of learning problems in childhood with ADHD: 60 % had learning problems as a child, and 30 % repeated a class at least once. About 50 % of the parents of patients sought help for the childhood learning problems through help with homework, remedial teaching, tutoring, or special education. Scientific literature has shown that adolescents with ADHD leave their education unfinished more often than normal, are suspended more often (18 % versus 6 %) or expelled from school (13 % versus 5 %), get lower grades, and leave secondary school without a diploma more often (35 % versus 5 %) (Weiss and Hechtman 1993; Mannuzza et al. 1997).

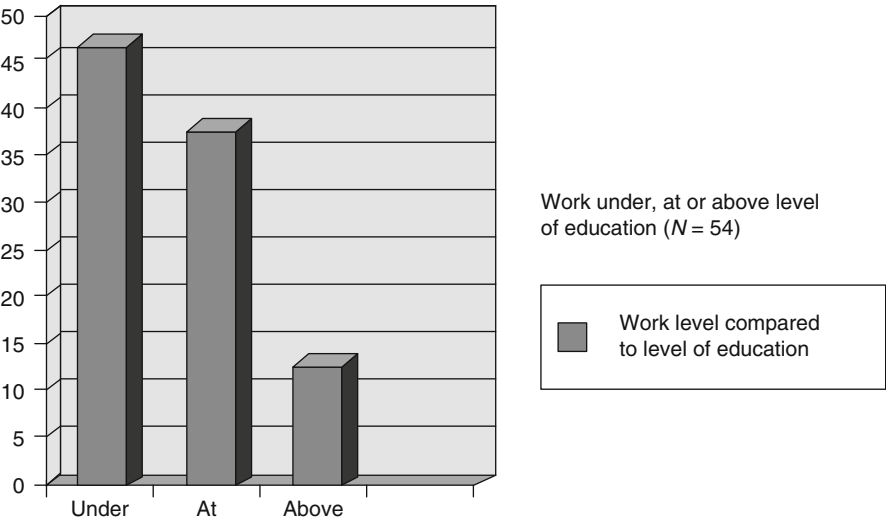
The fact that, in this study, almost half worked below the eventually obtained level of education indicated that a lapse in functioning occurs twice in people with ADHD: once in school and once more when seeking appropriate work. This underachievement can lead to a lot of suffering for people with ADHD; it is a lot more difficult for them to find a place where they can develop without the necessary certificates. Often, they do not succeed in this, and one can imagine that understimulation will more easily lead to job-hopping, conflicts, and being fired.

Because of underachievement in education and work, someone with ADHD will earn less than would have been the case without ADHD. The tendency to frequently change jobs or position means that growth, development, and promotion are often

**Table 2.4** Number of times they quit



**Table 2.5** Work level compared to level of education



not reached. The changes themselves bring with them an extra risk for loss of income (break in pension contributions, etc.) (Table 2.5).

**2.9.2 ADHD and Relationships: Short and Changing Often**

In the area of relationships, we can also find problematic patterns. Out of the 54 adults between the ages of 18 and 56, 38 had a relationship (70 %). Problems occurred in thirty relationships (78 %) (Kooij et al. 2004). In 68 %, the relationship lasted longer than 5 years. The relationship was described as being “good” by 45 % of patients and as “mediocre to (very) bad” by 55 % of patients. The partner was a bit more pessimistic still about the relationship. The reasons for the problems that were given were conflicts about insufficient communication, not enough intimacy; conflicts on not living up to agreements, not taking responsibility for family and household; conflicts regarding alcohol or drug abuse; and conflicts regarding aggressive behavior. Most relationship problems were related to a combination of the above-mentioned conflicts.

Before the current partner, they had often had several other relationships. Thirteen patients had not had a partner yet (24 %), 16 had one to four partners (30 %), 8 patients had five to ten partners (14 %), but 17 had more than ten partners (32 %). Thirty to forty short relationships were no exception in this last group. The duration of most relationships (excluding the last one) fits a pattern of short relationships with fast fluctuations (Table 2.6):

The duration of most previous relationships was less than a year in almost half of patients and less than 6 months in more than 35 %. This pattern of short and quickly changing relationships is usually not a problem yet for adolescents, who tend to experiment with relationships during this time in their life. It does however become a problem when people start to want to settle and when people with ADHD are then still not able to find and keep a steady relationship.

**2.9.3 Impact of ADHD on the Relationship**

The influence of ADHD is not only limited to the duration and the frequent changing of relationships. The quality of the relationship also suffers when one of the

**Table 2.6** Duration of previous relationships

| Duration of most previous relationships | N=53 | %    |
|---|------|------|
| <6 months                               | 19   | 35.8 |
| 1/2–1 year                              | 7    | 13.2 |
| 1–5 years                               | 6    | 11.3 |
| 5–10 years                              | 9    | 17   |
| n/a                                     | 12   | 23.6 |

partners has ADHD. Robin (2002) performed a study with the “marital impact checklist” (34 questions) in eighty couples, whereby one partner had ADHD. He interviewed 35 men (44 %) and 45 women with ADHD (56 %) and their partners. The average age was 42 years.

The problems from which both partners suffered the most were:

- Communication problems/problems with time management and self-regulation of emotions
- Forgetting things that have been discussed
- Saying things without thinking
- Not sustaining attention on conversations
- Difficulty dealing with frustrations
- Difficulty starting tasks
- Wrongly estimating time it takes to complete tasks
- Leaving a mess
- Not finishing things

The questions that were answered were:

1. How many items do both partners indicate as being burdensome?
2. How unloved/unimportant do the partners feel because of this?
3. The negative impact of this behavior on the relationship according to both partners.

The ADHD partner scored higher on the number of items, on feeling unloved, and on the negative impact of the behavior on the relationship. Here, there was no difference between men and women with ADHD. The relation between the scores of both partners was moderate to high. Of the partners without ADHD, men scored higher than women on the number of items, on feeling unloved, and on the negative impact of the behavior on the relationship. In summary, this research showed that:

- The ADHD partners experienced most problems and impact.
- The partner of a woman with ADHD is a lot more dissatisfied with the relationship than the partner of a man with ADHD.
- The gender role and the accompanying expectations may partly define the impact of ADHD behavior on a relationship, or in other words, the male partner of a woman with ADHD expresses his dissatisfaction more directly than the female partner of a man with ADHD (?).
- Health-care providers should pay more attention to information, acceptance, and understanding in male partners of women with ADHD.

### ***2.9.4 ADHD and Sexuality***

Little research has been done into sexual experiences of adults with ADHD. Clinical practice has shown that certain sexual problems can be associated with the ADHD symptoms: for instance, attention problems, poor concentration, being easily distracted,

or thinking of other things while having sex can create problems with having an orgasm. Partners having different bedtimes is another common problem for having sex. This can be caused by poor planning but also by a delayed sleep phase, which occurs in the majority of adults with ADHD, causing both partners to have a smaller chance of going to bed at the same time. There are also indications that some have an increased need for sex. Frequent masturbation in someone with ADHD could, for instance, be a way of fighting off inner unrest. Other biological aspects may also play a role.

Adolescents with ADHD have been researched. Remarkable findings are that they are generally sexually active a year before their peers (15 as opposed to 16 years) and show more risky sexual behavior: more partners, more one-night stands, and less use of contraceptives. This leads to more sexually transmitted diseases (STDs) (17 % versus 4 %) and a higher percentage of teenage pregnancies (38 % versus 4 %) compared to peers without ADHD (Barkley et al. 2006; Flory et al. 2006). In studies in adults, those with the combined type ADHD indicated that they were bisexual slightly more often compared to controls, but not homosexual. There was no greater occurrence of sexual problems or disorders with ADHD compared to control groups. Adults with ADHD did indicate more often that they did not want sex (49 % versus 25 %) (Barkley et al. 2007).

In Dutch research among 120 adults with ADHD (55 % men), more than half had sexual problems ( $n=64$ ) (Kooij 2002). There was no difference in the number of problems between the genders. The sexual problems were registered and afterward divided into categories. The following categories of sexual problems could be distinguished (Table 2.7):

In 48 of the problems (74 %), the issue was too much sex drive or not enough sex drive or both alternating in one person. Too much sex drive or not enough sex drive occurred almost equally. The difference in sexual desire between men and women was significant: men more often have too much sex drive compared to women who do not have enough sex drive ( $p<0.001$ ). A relationship with the subtype of ADHD could not be established because almost all patients had the combined type ADHD. Scientific literature shows indications that the combined type ADHD has a larger sex drive than the inattentive type (Canu and Carlson 2003). The sexual problems that appear to be directly related to ADHD ( $n=8$ ), such as unrest, tension, impatience, being easily distracted, and poor planning, can also lead to less (desire for) sex; these problems were equally divided between the sexes.

**Table 2.7** Sexual problems in 64 adults with ADHD

|  |    |
|--|----|
| Too much sex drive/obsessed  | 24 |
| Not enough sex drive   | 20 |
| Fluctuating between too much sex drive/not enough sex drive  | 4  |
| Others   | 17 |
| Pain during sex/physical complaints/use of antidepressants/relationship problems/doubts about being gay or straight    | 9  |
| Associated with ADHD: concentration problems in sex or orgasm/too restless/difficulty relaxing/impatient/poor planning | 8  |
| Total number of problems   | 65 |



### 2.9.4.1 Unpleasant Sexual Experiences

In the same Dutch study, 35 out of the 120 patients reported unpleasant sexual experiences (29.4 %), 27 women and 8 men. The experiences were recorded and then categorized. Two types of unpleasant sexual experiences were distinguished (in total 41): rape (27) and assault/inappropriate touching (14). Among the 22, perpetrators were 8 family members, 11 acquaintances, and 3 strangers. Apart from one, all of the perpetrators were men. There was a blood relation with seven perpetrators. In five of the perpetrators who were blood relatives, there was impulsive and aggressive behavior, unrest or mobility, and concentration problems. Even though this refers to a small group, this pattern could fit ADHD with comorbid behavioral disorders in perpetrators that were blood relatives of the victim.

#### 2.9.4.1.1 Sexual Abuse

Sexual abuse was reported in 22 of the 120 patients (18.3 %). Nineteen women and 3 men were involved. In 18 (82 %), the abuse took place during childhood or adolescence. The difference between sexual abuse and unpleasant sexual experiences was that the unpleasant experiences took place later in life and that they were one-time events. Seventeen patients were abused several times (Kooij 2002).

## 2.9.5 *The Impact of ADHD on the Family*

In the Dutch study among 54 adults with ADHD, 31 had one or more children (59 %) (Kooij et al. 2004). Twenty-four experienced problems with education (77 %). The reasons indicated for this were one or more children with ADHD symptoms, learning or behavioral problems, ( $n=18$ ; 58 %) and conflicts with the partner about the children's upbringing ( $n=14$ ; 45 %). Six patients reported other problems. The high percentage of children with problems is notable. This number corresponds with the results of the family study by Barkley (1997a), who found a risk of 50 % for ADHD in children in families with one parent with this condition.

Canadian research showed similar results. In this study, families with and without a parent with ADHD were compared (Minde et al. 2003). Children with a parent with ADHD had more psychological symptoms than children without a parent with ADHD. Furthermore, children with ADHD had more other disorders than other children. The relationships with the family and within the marriage suffered from this, regardless of the gender of the affected parent. The children without ADHD, from families with one psychologically healthy parent, did well, but the behavior of children with ADHD was always problematic. This behavior was not associated with the psychological health of the parent(s). The results of this study confirm the strong contribution of the genetic nature of ADHD. It is recommended that the

functioning of the partner without ADHD be adequately monitored; this partner has a lot of influence on the well-being of the children without ADHD in families where one parent suffers from this condition.

### **2.9.6 Conclusions**

In conclusion, families with ADHD have a hard time: because of underachievement in education and work, someone with ADHD will change jobs more often, have less financial security, and earn less than would have been the case without ADHD. There are additional physical and mental health risks that are associated with ADHD, bringing higher costs for society and the health-care system. Furthermore, there are usually problems in the relationship with the partner (in 78 %), as well as with the children's upbringing, up to 58 % of whom also exhibit ADHD symptoms and learning or behavioral problems. Children without ADHD in the family are at risk of being lost in all the hectic circumstances of the family. This brings with it great potential for conflict, and without treatment, patients cannot be expected to provide much structure or problem-solving capability. The partner could therefore be faced with the almost impossible task of keeping the family in order financially and emotionally, seeking help for all those who need it and continuing to cope in the midst of this. It seems as if it is about time that more attention is paid to the important role of the partner of adults with ADHD, both by family members and by health-care providers.

## **2.10 Purpose and Limitations of Collateral Information Obtained from Relatives**

The continuity of ADHD symptoms in the life of the patient needs to be established in hindsight. This is a problem when we take into account the results of research into the reliability of self-reporting (underreporting) in ADHD teenagers on their childhood (Barkley 1997a). Adults are also not always able to see their own functioning clearly. It is difficult for someone with lifelong ADHD symptoms to compare their own functioning to that of someone without ADHD.

It can therefore be useful to obtain collateral information from relatives about the childhood symptoms. The partner will be asked to report on the current symptoms. It is however not true that the diagnosis ADHD cannot be made without this information provided by a partner or relative. For instance, in patients who indicate that they have always had ADHD symptoms and who can give examples of this and the associated dysfunctioning, the diagnosis can be made reliably. Collateral information obtained from relatives is desirable when the memory of childhood behavior is insufficient or when there are doubts regarding the reliability of the patient about the medical history (for instance, in drug addicts).

Research using questionnaires shows that the patient is the best source of information, compared to the parents and the partner, that is, to say that reporting of symptoms by patients is closest to the reporting by the clinical researcher, who has weighed the information from all those who provided information during the intake. The partner and the parents score lower on questionnaires than the patient. The partner and parents also recognize external symptoms more easily than the more internal manifestations of ADHD, such as concentration problems. Therefore, the patient's story should in principal serve as a guideline. Patients report best on themselves, but are inclined to underreport compared to the clinical diagnosis. The collateral information obtained from relatives adds information on the frequency and severity of symptoms and can add to the medical history obtained from the patient (Kooij et al. 2008).

Sometimes it seems impossible to get information from relatives because family relations are problematic. It then often helps to explain that it is of great importance to the diagnosis to gather as much information as possible and that the family can help with this. After the intake, family problems do sometimes solve themselves when it becomes clear that a disorder like ADHD has played a role in this; the patient's own explanation of, for example, "conflicting characters" then gets an extra dimension without any blame being appointed. The explanation that follows the diagnosis is often enlightening for the patient, the family, and the partner. Many past events are better understood, and this can contribute to an improved relationship with the family.

A phenomenon that often occurs when gathering information from relatives in ADHD is that the family does not agree on certain symptoms or on the cause of events. This contradictory information can generate confusion for the researcher. This disagreement appears to be a phenomenon associated with families with ADHD which predicts a poorer prognosis (Ferdinand et al. 2004).

Because of the hereditary nature of ADHD, it is possible that more than one person in the family has ADHD, which can lead to bias in the form of underreporting the severity or denying the presence of symptoms ("If that's ADHD, then we all have it"). Even though more information is sometimes needed to reach a careful diagnosis, the information obtained from relatives therefore does not always guarantee the desired certainty.

In the new, structured diagnostic interview for ADHD (DIVA) (see Appendix A.3), the collateral information is obtained together with the medical history from the patient. This way, the questions only have to be asked once. Patient, family, and partner report the presence or absence of each symptom in childhood or adulthood. As a result, an impression is quickly given of each party's view on the symptoms; after which, the researcher can decide on a score for each of the DSM-IV criteria. This procedure aims to simplify the assessment process.

Often in the past, family relations have become disrupted as a result of conflicts and ignorance regarding the existence of ADHD. The diagnostic assessment and psychoeducation after the diagnosis can create an opening and have the effect of relieving all parties of blame, without ADHD having to be used as an "excuse."

After some time, family members who have recognized themselves in the symptoms might ask for help as well. Other family members might on the other hand reject the diagnosis because the symptoms are so common: “everyone is overactive in our family; he’s not even the worst one.” Some parents see the diagnostic assessment as an accusation, saying that they did something wrong in the past. ADHD is not primarily caused by an inferior upbringing, although the symptoms can be exacerbated by it. For this reason, parents are put at ease at the beginning of the examination. The diagnostic assessment mainly aims to get information about the performance of their daughter or son in childhood, and it does not aim to judge the upbringing. Very often, it turns out parents did well, for instance, by offering security and structure. Through their efforts, they managed to prevent a more serious dysfunctioning.

## **2.11 Family History**

ADHD often occurs in the family (Faraone et al. 2005). The heredity is therefore considered the most important risk factor for ADHD. A family history which is directed at ADHD symptoms and accompanying psychiatric disorders can provide information on hereditary aspects. Patterns of typical comorbidity in ADHD, such as anxiety, depression, alcohol and/or drug abuse, and impulsive and aggressive behavior, more often occur in families with ADHD. This information can support the diagnosis.

## **2.12 Additional Information**

If there are doubts about the lifelong presence of ADHD symptoms, reports from earlier psychological and psychiatric examinations and elementary school reports can be consulted. In reports from earlier examinations, the ADHD diagnosis will rarely be made. Often, the symptoms will be described in it. This method can help objectify the long-term presence of the symptoms.

Sometimes school reports give an accurate description of childhood behavior, in such a way that the diagnosis is supported, for instance, “poor concentration, easily distracted, can do much better, a lot of sloppy mistakes, and talks too much.” Good grades on an elementary school report card without comments on behavior do however not rule out the diagnosis.

## **2.13 Neuropsychological Examination**

There is no neuropsychological test that is sensitive and specific enough to be able to make the ADHD diagnosis. In the following neuropsychological tests related to attention and executive functioning, research has shown differences between

adults with ADHD and normal controls: the Continuous Performance Test (CPT), the Stroop test, and the WAIS FD/Digit Symbol; in the area of language skills, letter fluency: controlled oral word association (COWA) and category fluency: animals; with regard to memory, the California Verbal Learning Test (CVLT), the Wechsler Memory Scale Revised (WMS-R), and logical memory; in the area of self-report questionnaires, the emotional adaptation (various scales) and the Wender-Utah Rating Scale (WURS); in the area of personality tests, MMPI-2; and particularly on the F: depression, psychopathic deviation, psychasthenia, and schizophrenia scales (Downey et al. 1997; Mirsky 1987; Boonstra et al. 1999; Woods et al. 2002).

The problem therefore is that these tests will not show all patients with ADHD and that they will often not differentiate between other psychiatric and neurological controls and ADHD. In children and adults with ADHD, abnormalities were found at group level in the so-called executive functioning compared to control groups. In adults with ADHD, abnormalities were found for dividing and sustaining attention, verbal fluency, the ability to generate solution strategies, auditory-verbal learning, planning and organization, inhibition of behavior and/or impulsivity, programming of movements, cognitive flexibility, and speed of information processing. These dysfunctions are linked to the frontal-subcortical circuit. The problem here is that executive function disorders do not coincide sufficiently with the clinical diagnosis of ADHD so that these tests cannot serve as a reliable diagnostic tool. Executive function disorders identified those with more comorbidity, a lower education and work level, and lower socioeconomic status in a study among a group of ADHD patients (Biederman et al. 2006; Boonstra et al. 2005; Sergeant et al. 2002).

Another problem when doing neuropsychological tests is that patients, because of the stress and effort associated with these tests, can temporarily be more focused and therefore perform better than normal. Because of this, the researcher might wrongly conclude that there is no ADHD.

There is therefore currently no reliable neuropsychological test for the diagnosis, and patients might show fewer symptoms in it than they might have in daily life. Neuropsychological testing in adults with ADHD is being carried out for the benefit of differential diagnostic assessment in comorbidity, in tests of intelligence, or in order to gain more insight into the personality or coping style of the patient. Evaluation of the treatment effects of medication, measured using executive function tests, will possibly produce a tool for clinical practice in the future (Bron and Kooij 2012).

A new area of research is formed by the so-called biological endophenotypes that describe phenomena at the level between genes and behavior. In such research, neuropsychological, neurophysiological, genetic, and neuroimaging measures are combined in order to take a closer look at the pathophysiology of different disorders and, eventually, to develop objective measures for diagnostic assessment (Crosbie et al. 2008; Doyle et al. 2005).

## 2.14 Overdiagnosis and Underdiagnosis

Adult ADHD is increasingly recognized, diagnosed, and treated, but the disorder is a new diagnosis in adult psychiatric care. Hardly any educational program in the mental health-care sector has included the diagnostic assessment and treatment of ADHD in adults in its standard curriculum. As a result of this, professionals are often not educated on the subject and feel unsure about giving the diagnosis or starting a treatment with medication. Others might reach a diagnosis too quickly without asking the right questions and without knowing about the available diagnostic instruments. During this phase, there is a chance of both overdiagnosing and underdiagnosing ADHD.

Although the media often show a fear of overdiagnosing and overtreating adult ADHD, Dutch prevalence and prescription figures for 2005 show that about 6.4 % of the adult prevalence were prescribed medication (Kooij 2006). These figures therefore point to underdiagnosis and undertreatment, rather than an overdiagnosis of adult ADHD.

New textbooks on psychiatry have appeared in several languages in the past few years, which include chapters on developmental disorders, such as ADHD and autism, which persist into adulthood. Expertise centers in several countries have started to organize education for professionals, and ADHD networks provide training and conferences in the field (for addresses, refer to page 229). These measures are however insufficient for also educating psychologists/psychotherapists, social psychiatric nurses, GPs, physicians in (insurance) companies, and other professionals. By implementing new knowledge into the mental health-care educational programs, a common level of knowledge will in the long run be built among all professionals, which will lead to careful diagnostic assessment and up-to-date patient care.

Overdiagnosis and underdiagnosis of adult ADHD can be prevented only by implementing new knowledge into mental health-care educational programs.

## 2.15 Comorbidity and Differential Diagnosis

The diagnostic phase should always include assessment of comorbidity, in addition to assessment of ADHD. This is because on the one hand, ADHD almost always coincides with one or more associated disorders, and on the other hand, the diagnosis of ADHD cannot be made unless it is separated from other disorders. For instruments that can be used in the diagnostic assessment of comorbidity, refer to the SCID manuals.

### **2.15.1 *Comorbidity in ADHD***

ADHD in outpatients is accompanied by one or more associated psychiatric disorders in three-quarters of cases. The average number of comorbid disorders in referred patients with ADHD is three (Biederman et al. 1993; Kooij et al. 2001a, 2004). In the National Comorbidity Survey Replication (NCS-R) in the general population in the USA, the same pattern of comorbidity was found in nonreferred patients. The presence of three comorbid disorders increased the chance of ADHD in the general population 8.3 times (Kessler 2007). This means that ADHD is not an innocent condition, but an often undiscovered disorder in patients who have already sought help for complex, possibly therapy-resistant problems. This research showed that ADHD that was not in remission or that was untreated leads to chronicity of comorbid disorders. This was mainly the case in mood disorders, among them bipolar disorder, posttraumatic stress disorder, generalized anxiety disorder, panic disorder, and dependency on drugs. The chances of ADHD in a mood disorder were 20 %, in an anxiety disorder 17 %, and in addiction 18 %. Vice versa, mood disorders occurred in 31 % of those with ADHD, anxiety disorders in 51 %, and addiction in 14 % (refer to Table 2.8).

The pattern and frequency of comorbidity in adults and children with ADHD are remarkably consistent. Children with ADHD often have, just like adults, comorbid mood, anxiety, and behavioral disorders (the precursors of later occurring personality disorders), as well as tics and autistic spectrum disorders (Elia et al. 2008). Similar percentages of these comorbid disorders in childhood and adulthood point to an early onset of many of the disorders in childhood.

ADHD is accompanied by comorbidity in three-quarters of patients, and an ADHD patient has on average three comorbid disorders.

### **2.15.2 *ADHD in Other Disorders***

In populations of patients with disorders that often coincide with ADHD, such as depression, bipolar disorder, anxiety, sleep and personality disorders, and addiction, the chances of ADHD are therefore elevated. This has by now been shown in research among such populations. In a population of depressed patients, 16 % turned out to also have ADHD (Alpert et al. 1996), and in anxiety disorders, ADHD percentages of 23–33 % are found (Fones et al. 2000; Van Ameringen et al. 2011). In alcohol or drug addicts, both in the Netherlands and the USA, a conservative estimate of the prevalence of ADHD is around 20–30 % (Glind et al. 2004; Goossensen et al. 2006; Schubiner et al. 2000; Wilens et al. 1994, 2007; Wood et al. 1983). In German research in 118 women with borderline personality disorder, 41 % had a history of ADHD in childhood, and 16 % still suffered from ADHD. In this patient

**Table 2.8** Occurrence of comorbid disorders in ADHD

|  | Clinical study of adults                             | Epidemiological study of adults  | Clinical study of children |
|--|--|--|----------------------------|
| Some comorbidity   | 75 %   | 66 %   | 66 %                       |
| Average number of comorbid disorders per patient               | 3  | Chances of ADHD increased 8.3 times with three comorbid disorders                | –                          |
| Depressive disorder  | 25–66 % (60 % of which displayed a seasonal pattern) | 31 %   | 20–25 %                    |
| Bipolar disorder   | 10 % (mostly type II)                                | Chances of bipolar disorder increased 6.2 times in ADHD                          | 20 %                       |
| Anxiety disorder   | 25–63 %  | 51 %   | 15–25 %                    |
| Addiction  | 25–55 %  | 14 %   | 10–25 %                    |
| Smoking  | 40 %   | Each ADHD symptom contributes to an earlier onset of smoking and to more smoking | 20–30 %                    |
| Sleeping disorder (predominantly delayed sleep phase disorder) | 80 %   | –  | 73 %                       |
| Behavioral or personality disorder                             | 6–25 % cluster B                                     | –  | 45–50 % ODD or CD          |
| Eating disorder (predominantly bulimia)                        | 9 %  | –  | 4 %                        |
| Autistic spectrum disorder                                     | –  | –  | 22 %                       |
| Tic disorder   | 11 %   | –  | 50 %                       |

*References:* Amons et al. (2006); Biederman et al. (1991, 1993, 2002, 2005a ; Brown (2000); Elia et al. (2008); Gau et al. (2007); Kessler (2007); Knell and Comings (1993); Kollins et al. (2005); Kooij (2006); Kooij et al. (2001a, 2004, 2008); Ronald et al. (2008); Spencer et al. (2000); Van Ameringen (2008); Van der Heijden et al. (2005); Van Dijk et al. (2011, 2012); Van Veen et al. (2010); Weiss et al. (1985); Wilens (2004) ; Wilens et al. (1994)

group, childhood ADHD correlated with emotional abuse in childhood, with more comorbidity on axis I and II and with more serious borderline symptoms (Philipsen et al. 2008). Similar results were found in an Italian study (Fossati et al. 2002). In Dutch research among 103 borderline patients that has not been published yet, 33 % were also found to have ADHD (van Dijk et al. 2011, 2012).

The conclusion is that the percentage of ADHD in comorbid disorders in the groups of patients that have been researched until now is always around 20 %. This means that one in five psychiatric or addicted patients who seek help in outpatient or inpatient facilities could also have ADHD. This high number has consequences for the organization of patient care and mental health-care training programs (also refer to Sect. 2.14).



One in five psychiatric patients also has ADHD.  
Untreated ADHD can contribute to the chronicity of the comorbidity.

### **2.15.3 ADHD and Health**

#### **2.15.3.1 ADHD, Binge Eating, and Obesity**

In children with ADHD, there was a significantly greater occurrence of obesity than normal, despite the mobility that is associated with the disorder. In population studies, children who are not being treated with medication for ADHD have an increased chance of obesity, while children who receive treatment are more often underweight (Holtkamp et al. 2004; Waring et al. 2008). Stimulant drugs used in the treatment of ADHD inhibit appetite, thereby decreasing calorie intake, in particular calories from fatty foods (Liu et al. 2008).

Sixty percent of adults with ADHD aged 18–56 ( $n=120$ ) display eating problems in a study, in particular binge eating (Kooij et al. 2001a). Most describe their eating behavior as “impulsive” or “a way of calming myself down.” The binges occur one or more times a day in almost 40 % of patients; in 40 %, they occur at least once a week, and in the remaining patients, they occur at least once a month. It is notable that patients indicate that they forget to eat or that they do not plan their meals well (Kooij et al. 2001a). Almost 40 % of the patients had weight fluctuations, 22 % between 10 and 20 kg and more than 20 kg in over a third of this group. The length and weight of a subgroup of 54 patients was known. Sixty-five percent of those with a body mass index (BMI) of more than 25 had binges, compared to 35 % of those with a BMI of less than 25. Of those with a BMI greater than 30 ( $n=6$ , 11 %), all had a pattern of fluctuating weight and binge eating.

#### **2.15.3.2 Skipping Breakfast and Obesity**

Children and adolescents who skip the first meal of the day, breakfast, are heavier than peers who do have breakfast. Research among Dutch families showed that one in seven families does not have breakfast; in Canada, this is one in ten (Boere-Boonekamp et al. 2008; Dubois et al. 2008; Mota et al. 2008). The children ate more protein-rich lunches and more carbohydrates at the end of the afternoon, and this resulted in a higher weight and BMI compared to children who had had breakfast. Furthermore, children who eat breakfast perform better in school (Berkey et al. 2003). It is conceivable that skipping breakfast will be compensated for later in the day. This is not the time for a healthy meal, as mainly snacks with large amounts of fats tend to be available. Adults with ADHD often skip breakfast and sometimes lunch as well. It is conceivable that the binges are thus triggered, as previous meals were postponed or skipped. This pattern of postponing meals or forgetting to eat can

coincide with concentration and organization problems in ADHD but also with the ADHD-related disrupted biological clock or circadian rhythm (refer to ADHD and sleeping disorders). By moving back both sleep and meals, the rhythm of various metabolic processes is also shifted. After 3 weeks of research in healthy volunteers, results showed that glucose levels did not drop sufficiently after late evening meals, which is associated with a disrupted insulin response. A nocturnal activity and eating pattern will thus become a risk factor for obesity and diabetes (Qin et al. 2003).

Obesity in ADHD can also occur as a result of increased appetite in winter in those with winter depression (in approximately 30 %). The winter or seasonal depression is also associated with a disrupted circadian rhythm (Lewy et al. 2006). A correlation was also found between mood, ADHD symptoms in childhood, weight, and the expression of the DRD4 gene, in particular the 7-repeat allele, in a group of women with winter depression who are familiar with overeating and who gain weight during the winter months (Levitan et al. 2004). The DRD4 gene that is associated with ADHD also appears to play a role in the common pattern of seasonal depression and obesity in this group. The DRD4 gene is also more often found in populations with alcohol or drug addiction, gambling, obesity, ADHD, and Gilles de la Tourette (Blum et al. 1995).

Until we know exactly why ADHD patients skip breakfast, the advice to just have breakfast is probably insufficient for patients. However, it is true that those who manage to have breakfast do have a greater chance of controlling their weight. A side effect of treatment with stimulant drugs may also be that the weight is controlled better because of the well-known side effect of stimulant drugs, which is decreased appetite.

The relation between ADHD and obesity appears to occur as a result of skipping and poor planning of meals, binges, and an increased prevalence of winter depression in ADHD (which is associated with an increased appetite).

### 2.15.3.3 ADHD and Obesity

Vice versa, ADHD is found in 27 % of patients with serious obesity (BMI > 35) (Altfas 2002; Cortese et al. 2007; Fleming et al. 2005). The chances of ADHD are strongly increased in more serious forms of obesity: in a BMI > 40, chances of ADHD are 42.6 %. The exact correlation between the two is not yet clear and is possibly explained by defects in dopamine and insulin receptor activity in the brain (Cortese et al. 2008). In ADHD, a dopamine deficiency is presumed, disrupting the “dopamine reward system.” This disruption of the dopamine system could also play a role in compulsive or addiction-related behaviors such as binge eating and obesity (Campbell and Eisenberg 2007; Liu et al. 2008). The chances of ADHD are further increased by excessive sleepiness during the day in obese adolescents (Cortese et al. 2007, 2008). This could fit the previously mentioned hypothesis which states that a disruption of the circadian rhythm has an influence on all these processes.

In families with genetic obesity as a result of a mutation in the melanocortin 4 receptor (MC4R) (C271R), regulation of hunger and satiation is disrupted, which leads to abnormal eating behavior. Homozygote patients had an 80 % chance of ADHD; heterozygotes, a 22 %. Thus, in genetically determined obesity, there also appears to be a relationship with ADHD (Agranat-Meged et al. 2008).

In a prospective follow-up study among 12,500 schoolchildren, the mother's weight during pregnancy was associated with ADHD in the child. There were controls for duration of pregnancy, birth weight, weight increase and smoking during pregnancy, age and education of the mother, the child's gender, family structure, and country of origin. Women who were overweight before pregnancy and who gained a lot of weight during pregnancy had doubled their chances of having a child with ADHD symptoms, compared to women with normal weight (Rodriguez et al. 2008). These findings show the importance of weight control in this population, which already has an increased genetic risk for the disorder.

The chances of ADHD are highly elevated in severe obesity and in excessive sleepiness during the day. Obesity in pregnancy also increases the chances of ADHD in the baby. There appears to be a relation between the problems with appetite, sleep, and weight in ADHD.

## **2.15.4 ADHD and Sleep Disorders**

### **2.15.4.1 Sleep Disorders in Children**

(Subjective) Questionnaires distributed among parents of children with ADHD show that these children often have difficulty going to sleep or they do not want to go to bed. Consequently, they find it difficult to get up in the morning. Sleep is often interrupted, and sleep efficiency is decreased, leading to sleepiness during the day. Objective research with the multiple sleep latency test (MSLT), actigraphy, polysomnography, and measurements from the dim light melatonin onset (DLMO) partly confirm the findings from the questionnaire study. Children with ADHD are indeed sleepier during the day than the control group children. They are more mobile and restless during sleep, which is also called restless legs syndrome (RLS) or periodic limb movement disorder (PLMD) (Corkum et al. 2001; Cortese et al. 2005; Gaultney et al. 2005; Konofal et al. 2001; Lecendreux et al. 2000; Sadeh et al. 2006). Both ADHD and RLS or PLMD are associated with a disruption in dopamine levels, and both are treated with dopamine agonists. More research into overlap and differences between both disorders is needed. It is possible that a ferritin deficit, which has been shown in children with ADHD, plays a role in the disrupted dopamine metabolism (Konofal et al. 2004, 2008; Oner et al. 2007). Furthermore, the melatonin onset in

children with ADHD who have difficulty getting to sleep happens 45 min later than in ADHD children who do not have difficulty getting to sleep, which fits in with a delayed sleep phase resulting from a disruption of the circadian rhythm (van der Heijden et al. 2005; 2006). Treatment with melatonin made the sleep phase in these children earlier and increased sleep duration (van der Heijden et al. 2007). Little is still known about the genetic backgrounds of delayed sleep phase in ADHD (Gruber et al. 2000; Lamont et al. 2007; van der Heijden et al. 2005).

#### **2.15.4.2 Subtype and Sleep Problems**

Children with the inattentive subtype of ADHD have fewer sleeping problems than children with the combined subtype. Comorbid anxiety or depression is associated with more sleeping problems, but an associated oppositional defiant behavioral disorder is not. Sleepiness during the day is most prevalent in the inattentive subtype; they sleep more than normal (Mayes et al. 2008). In university students and in adults with ADHD, a similar relation between ADHD and sleeping problems is found. The combined subtype sleeps less, while the inattentive subtype has a greater need for sleep (Gau et al. 2007; van Veen et al. 2010). On the other hand, impulsivity occurs more in evening persons, in accordance with the relationship between the delayed sleep phase and the combined or hyperactive/impulsive type of ADHD (Caci et al. 2004, 2005).

#### **2.15.4.3 Sleep Disorders in Adults**

In adults with ADHD, similar sleeping problems are found to those in children. Adults with ADHD report a lower quality of sleep in relation with difficulty getting to sleep and fatigue when getting up (Schredl et al. 2006). Almost 80 % of adults with ADHD go to bed late (between one and three o'clock at night) and prefer to get up late as well (Kooij 2001a; van Veen et al. 2010). If they go to bed early, they have difficulty getting to sleep. Sleeping through the night is also difficult. More than 60 % of the adults are sleepy during the day. The sleepiness leads to an exacerbation of the concentration disorder in ADHD. The majority have had these sleeping problems since childhood (Bekker et al. 2008; Dodson 1999; Kooij 2001a). This sleeping pattern can be associated with a delayed sleep phase which is connected to a disruption of the biological clock. People with this kind of sleeping pattern are also called evening types. In the normal working population, around 25 % of people are evening types. They often work night shifts and are unemployed more often than morning types, and they are less healthy. The chronotype (evening or morning type) is not dependent on gender, ethnicity, or socioeconomic status, but it is dependent on age (Paine et al. 2006). A younger age (30–34 years) is more often associated with the evening type than an older age (45–49 years).

A delayed sleep phase often leads to shorter sleep duration, for instance, when people have to get up early for school or work. Shorter sleep duration is generally associated with obesity in children and adults, again showing the relationship between

sleep and weight (Cappuccio et al. 2008). Initial comparative research into the Dim Light Melatonin Onset (DLMO) of adults with ADHD with and without difficulty getting to sleep, points – just like with children – to a strongly delayed sleep phase as a result of the melatonin production starting too late in those with difficulty getting to sleep (van Veen et al. 2010). Treatment with a low dose of melatonin at the end of the afternoon and/or light treatment in the morning can be effective here (Lewy et al. 2006; Pandi-Perumal et al. 2007). Initial experiences with melatonin in practice do point to positive effects on getting to sleep and getting up (Kooij 2008).

There are mixed reports on mobility at night in adults, as measured with actigraphy. It has been shown that adults with ADHD have more difficulty getting to sleep compared to controls and that they have lower sleep efficiency and wake up more often (Boonstra et al. 2007; Kooij et al. 2001b). In adults with Restless Legs Syndrome (RLS), just like with children, ADHD is found more often than in controls (Wagner et al. 2004). Iron deficiency (ferritin) could be an etiological factor in the relationships between hypodopaminergic disorders such as ADHD, RLS, and also Gilles de la Tourette (Cortese et al. 2008). Iron is needed for the dopamine metabolism.

Adults with ADHD, especially those with obesity and cardiovascular diseases, more often suffer from breathing problems that could also contribute to disrupted sleep, such as sleep apnea. Sleep apnea leads to sleepiness during the day and to cognitive problems (Gosselin et al. 2006; Mazza et al. 2005; Naseem et al. 2001; Yuen and Pelayo 1999). The relationship between sleep apnea, obesity, and cardiovascular diseases is also described as the metabolic syndrome (Vgontzas et al. 2005).

RLS or PLMD, sleep apnea, a delayed sleep phase, and sleepiness during the day occur more in children and adults with ADHD. These processes appear to be triggered by dopaminergic metabolic problems, in which ferritin deficiency and delayed onset of melatonin probably play a role. Sleep problems all have in common that sleep is interrupted and the sleep duration is decreased.

Finally, excessive sleepiness during the day, which seems to be associated with ADHD, can create diagnostic confusion with narcolepsy or hypersomnia. In comparative research with questionnaires in groups of hypersomniac and or narcoleptic patients and a group of ADHD patients, there did indeed turn out to be overlap. Almost 20 % of the hypersomnia group also met the ADHD criteria, and 38 % of the ADHD group were sleepy during the day (Oosterloo et al. 2006). It seems appropriate to investigate both disorders with these types of complaints.

In summary, hyperactive mobility at night (RLS or PLMD), sleep apnea, a delayed sleep phase, and sleepiness during the day occur more in children and adults with ADHD. The relationships between these phenomena seem to occur as a result of dopaminergic metabolic problems, in which ferritin deficiency and too late onset of melatonin possibly play an etiological role. All sleep problems have in common that sleep is interrupted and that the sleep duration is decreased.

#### **2.15.4.4 Sleep Duration, Obesity, and Cancer**

Shorter sleep duration is associated with obesity, diabetes, cardiovascular diseases, and cancer (Cappuccio et al. 2008; Knutson and Van Cauter 2008). Melatonin, the hormone that regulates our day and night rhythms, also has a protective action against cancer. The total amount of melatonin that is produced at night could coincide with the duration of sleep and thereby with the duration of the melatonin production. The sleep duration in the general population has only decreased since the start of the previous century (from 8–9 h to 6–7 h). Shorter sleep duration coincides with a longer exposure to artificial light in the evening. This exposure to artificial light breaks down melatonin and is associated with an elevated risk of cancer (Kayumov et al. 2007). One hypothesis could be that a lower level of melatonin because of a shorter sleep duration (and exposure to light) contributes to an elevated risk of cancer in the long term. Support for this hypothesis is derived from research in a large group of men in which long sleep duration is associated with a decreased occurrence of prostate cancer (Kakizaki et al. 2008). More support comes from the Nurses' Health Study, about which the Health Council of the Netherlands reported in 2006 (Health Council of the Netherlands 2006). In this research, years of night shifts (mainly when performed for more than 30 years) and exposure to light are associated with decreased melatonin levels in morning urine and an increased occurrence of breast cancer (Schernhammer and Hankinson 2005; Schernhammer et al. 2006). In addition to this hypothesis, there are many other factors that increase the risk of breast cancer, such as hereditary factors, frequent flying, hormone therapy, alcohol abuse, obesity, and not having children or having children late in life (Moser et al. 2006). However, research into risk factors for cancer is complex, and there is not one factor that can be singled out as being the most important one. On the other hand, the clustering of risk factors for cancer in ADHD patients (alcohol abuse, smoking, shorter sleep duration, and obesity, possibly lower melatonin levels as a result of delayed sleep phase, night shifts, and exposure to light) is a trigger for further research. The oncostatic properties of melatonin are somewhat supported by lab research but are still insufficiently clear for concrete application (Bartsch et al. 2000; Panzer and Viljoen 1997). Much more research is needed into these relationships before final conclusions can be drawn.

#### **2.15.5 ADHD and Mood**

ADHD is often associated with short-term or long-term mood problems, mood swings, and mood disorders. The mood can drop in a certain season (mainly autumn and winter), a certain period (premenstrual, postnatal, or perimenopausal); it can be a reaction to a setback or have an unclear relationship with a certain period or cause. This comorbidity can be quite a puzzle when it comes to the differential diagnosis. In the following sections, tools for the diagnostic assessment and differential diagnosis of mood problems in ADHD will be offered.

### 2.15.5.1 ADHD and Mood Swings

Almost all adults with ADHD show a lifelong pattern of quick irritability and frequent mood swings; their mood changes four to five times a day. This type of pattern has been found repeatedly in research in 90 % of adults (Kooij et al. 2001, 2006). In the United States as well, the relationship between ADHD and mood swings has been noted; this has resulted in the inclusion of the subscale emotional lability in the Conners Adult ADHD Rating Scale (CAARS) (Conners et al. 1999). The mood swing is often reactive; the cause might, for example, be a setback related to the ADHD symptoms; for instance, the patient forgets something yet again or realizes, after shutting the door, that they have left their key inside. But even without a clear cause, the mood can quickly change from cheerful or overly enthusiastic to sad or irritable. The so-called short fuse which characterizes many people with ADHD can be seen as one of the ways in which the mood change manifests itself. Important indications that the mood swings might have to be interpreted as mostly belonging to the ADHD syndrome, rather than as a mood disorder in the stricter sense of the word, are the high prevalence of mood swings in adults with ADHD (in 90 %), their chronic nature (so not episodic as in a mood disorder), and the response to treatment with stimulant drugs. The mood swings, including irritability, generally recede upon treatment with stimulant drugs, just like the other ADHD symptoms. If this is not effective enough, an SSRI can be added.

Many women suffer from a cyclical, premenstrual increase in their mood swings, which can be quite severe, including suicidal tendencies (Quinn and Nadeau 2002). Women with ADHD and premenstrual dysphoric disorder (PMDD) often have a lower mood during the rest of their cycle and a history of depression. Treatment with SSRIs during the entire cycle is generally effective (Shah et al. 2008). Hardly any research has been done into this comorbidity in women with ADHD.

The daily mood swings in ADHD need to be distinguished from a depressive episode with irritable mood, from a (rapid cycling) bipolar disorder, and from the borderline and antisocial personality disorder that coincides with emotional lability. There appears to be an overlap with the criteria of ultrarapid cycling bipolar disorder, cyclothymia, or the so-called cyclothymic temperament; there is a lot of discussion about which spectrum these diagnoses belong to: the bipolar spectrum or that of the temperament/personality (Angst et al. 2008; Bauer et al. 2008; Phelps et al. 2008).

Considering that mental health-care professionals are still relatively unfamiliar with ADHD in adults and the accompanying mood swings, they will more likely think of bipolar disorder or cluster B personality disorder in the case of mood changes, rather than of ADHD. This problem of a lack of knowledge surrounding ADHD in adults can also occur in (population) research in which instruments are used that do not (yet) include the diagnostic criteria of ADHD in adults, such as the CIDI, the SCID, and the SCAN. The CIDI has however recently included a section on ADHD in adults (Fayyad et al. 2007).



In the differential diagnostic assessment, the following criteria are used:

1. The frequency of the mood swing (4–5 times a day in ADHD and cluster B personality disorders, a minimum of 2–3 days in a hypomanic episode)
2. The course (chronic in ADHD and cluster B personality disorder, episodic in bipolar disorder)
3. The age of onset (childhood in ADHD, usually later in the bipolar and personality disorders)

Children with ADHD also exhibit irritable moods, but this is often categorized under the comorbid diagnosis oppositional defiant disorder (ADHD). The severity and duration of the irritability is often seen as an indicator of the comorbid diagnosis, which can vary from ADHD (unstable mood/short fuse) to depressive disorder (severe/long-term irritability) to bipolar disorder (explosive/violent irritability) (Spencer 2007).

It is necessary to get as much clarity as possible before the treatment about the type of mood swings the patient suffers from. Making a life chart of the changing moods over time can help here. A comorbid bipolar disorder or a depressive episode should after all be treated before starting treatment of ADHD. Chronic, quickly changing mood swings that occur four to five times a day do not need to be treated first and often decrease after treatment with stimulant drugs.

90 % of adults with ADHD suffer from lifelong, rapid mood swings (four to five times a day), and outbursts of anger.

### 2.15.5.2 ADHD and Depression

Depression and dysthymia occur frequently in adults with ADHD. It is conceivable that a long-lasting pattern of failure in many areas leads to a loss of perspective and a low mood. However, this cause of the gloominess does not exclude the diagnosis depression. If the low mood and the loss of interest last for more than 2 weeks and lead to an impairment in functioning, the diagnosis depression needs to be considered (APA 1994).

Recurring depressive episodes occur in 55 % of adults with ADHD in clinical populations (Amons et al. 2006; Kooij et al. 2004). Vice versa, ADHD is found in about 20 % of those with a depression in both clinical and epidemiological studies (Alpert et al. 1996; Kessler 2007).

Studies of young women with ADHD revealed a risk of depression that is 2.5 times higher than that of control groups. The depressions started earlier, lasted twice as long, were associated with more severe depression-associated dysfunctioning and more suicidal tendencies and more often required admission than in the case of controls. Mood disorders also occurred more often in the family: depression in the parent(s) and mania in a brother or sister-predicted depression in the women with ADHD (Biederman et al. 2008a, b, c).



Symptoms of ADHD and of a depressive episode overlap in terms of concentration problems, sleep problems, any psychomotor agitation or slowness, and fatigue or loss of energy. However, in ADHD, these complaints are chronic from childhood, while in a depressive episode, there is a period before and after the complaints. Depressed patients can distinguish between their normal self and the depressed episode; ADHD patients only know their chronic condition with complaints. In the combination of ADHD and depressed episodes, both patterns can be distinguished.

### 2.15.5.3 ADHD and Winter Depression

The lifetime prevalence of depression in adults with ADHD is 55 % in clinical research (Amons et al. 2006). Of those with a depression, 61 % had a seasonal pattern of the mood disorder, also called a winter depression. Prevalence of winter depressions in the total group of adults with ADHD is estimated at 27 %. Women more often had a seasonal pattern of the mood disorder than men. This prevalence is similar to the prevalence of 19 % in the only other research on adults with ADHD and winter depression in Canada (Levitan et al. 1999). The prevalence of the seasonal depression in the general population in the Netherlands is estimated at 3 % (Mersch et al. 1999). The winter depression is therefore about ten times more prevalent in Dutch adult patients with ADHD. Some patients are depressed throughout the year, whereby the atypical symptoms of the winter depression are added in winter (eating more, gaining weight, and needing more sleep). According to the guidelines for depression, depressive episodes are treated with evidence-based psychotherapy and/or an SSRI, and for winter depression, the first choice of treatment is light therapy.

There is a relation between the increased prevalences of seasonal depression and of delayed sleep phase in adults with ADHD. Both are correlated with a disruption of the biological clock or the melatonin rhythm (Lewy et al. 2006b). It is interesting that light therapy is effective for both winter depression and delayed sleep phase, provided it is administered at the right time (early in the morning). Recent research also suggests an effect of light therapy on ADHD symptoms (Rybak et al. 2006, 2007). More research into these relationships is necessary. It is not known exactly how light affects mood and sleep rhythm; it is however known that melatonin is broken down as a result of light entering through the eyes and that the body and brain “wake up” as a result of this. Further research will have to point out how exactly the melatonin, serotonin, and dopamine metabolisms affect each other. There are indications to suggest that these processes are genetically driven (Kissling et al. 2008; Levitan et al. 2002, 2004; Roeklein et al. 2008), but much is still unknown.

Depressive episodes occur (lifetime) in 55 % of adults with ADHD. Sixty percent of these suffer from winter depression, for which light therapy is the therapy of choice. With light therapy in the morning, the day/night rhythm may also be reset, which is important for the treatment of the delayed sleep phase in ADHD.

#### 2.15.5.4 ADHD and Bipolar Disorder

Bipolar disorder occurs in 2–5 % of adults (Merikangas et al. 2007). In children with ADHD, bipolar disorder occurs more often, namely, in 10–20 % (Biederman et al. 2005a; Hinshaw et al. 2006). Adults with ADHD also have a bipolar disorder more often (in 10 %) (Biederman et al. 1993, 2002).

The juvenile-onset bipolar disorder (JOB), with an early onset in childhood, occurs in 15 % of those with a bipolar disorder. Because of the early onset of the bipolar disorder, it can be difficult to distinguish this from ADHD, which also starts early. Moreover, JOB very often goes hand in hand with ADHD (up to 85 %). This combination forms a more serious subgroup of the bipolar disorder (Singh et al. 2006). ADHD and JOB occur more often in families, suggesting a stronger genetic loading (Faraone et al. 2003; Masi et al. 2006). Another antecedent of a bipolar development is comorbidity of ADHD with an oppositional defiant disorder (ODD) or with a conduct disorder (CD) in childhood. In this combination, there is an elevated chance of the development of a bipolar disorder (Harpold et al. 2007).

Population research in the USA shows that ADHD carries with it a 6.2 times elevated risk of a bipolar I or II disorder in adulthood (Kessler 2007). ADHD and bipolar disorder therefore appear together relatively often, which might complicate treatment.

An initial clinical study into the occurrence of ADHD in a group of bipolar II patients shows that at least 18 % of the bipolar II patients also have ADHD. In this study, 62 bipolar II patients were offered screening and, when scoring above a certain cutoff point, diagnostic assessment for ADHD. Of the 42 patients that completed the self-report questionnaire for ADHD (also refer to page 240), 48 % ( $N=20$ ) scored on or above the cutoff point. Fourteen of them were examined further, and in 11 (18 %), the ADHD diagnosis was made. A limitation of the study is the large number of patients who refused to participate; if more patients had participated, the percentage of comorbid ADHD might have been higher. By comparison, in research in the USA, ADHD was established in 30 % of a bipolar population (Sentissi et al. 2008). Those with comorbid ADHD and bipolar disorder were female significantly more often, and they significantly more often had had four or more relationships (Rops and Blom 2010). Ten of these patients were offered treatment for ADHD, consisting of psychoeducation and addition of methylphenidate to the already existing treatment with a mood stabilizer: after 2 years, the results in seven patients were the following: the mood had increasingly been stabilized, fewer benzodiazepines and sometimes less lithium was needed, and there was more rest, less impulsivity, better concentration, and a better quality of life. The diagnosis of ADHD was seen as valuable by most; they could take the symptoms into account better and find a place for them. The researchers concluded that treatment with methylphenidate appears to be possible and even desirable in bipolar II patients with ADHD who are being treated with a mood stabilizer. The course of the bipolar disorder appeared not to be influenced, or it was positively influenced by methylphenidate. The group with ADHD and bipolar II disorder that did not use methylphenidate appeared to function worse than the group who did (Seelen et al. 2009). This pilot study should be replicated with a larger population of patients.

In summary, ADHD and in particular bipolar disorder type II often coincide. The disorders are clinically distinguished on the basis of a thorough knowledge of the symptoms, the onset, and the course of both disorders. There is a relationship between seasonal or winter depression, bipolar II disorder and delayed sleep phase disorder (DSPS), and all occur more in ADHD. Combined treatment of a mood stabilizer with methylphenidate has been shown in initial pilot studies to produce favorable effects in patients with ADHD and a bipolar disorder, but more research is needed before final statements can be made.

### Differentiating Between ADHD and Bipolar Disorder

ADHD and bipolar disorder can be distinguished based on the age of onset, the course, and the symptoms. ADHD starts in childhood; the bipolar disorder usually later, in puberty. ADHD patients are chronically overactive, irritated, or hyperactive, while patients with a bipolar disorder are episodically hyperactive (Leibenluft et al. 2006). In ADHD, there is no episodic sexual disinhibition, but patients are often “chronically infatuated”. In bipolar disorder, there is more need for sex and more sexual activity but only during a (hypo)manic episode. People with ADHD generally have low self-esteem, while patients with bipolar disorder can have grandiosity during a (hypo)manic phase. Furthermore, the genetic nature of both ADHD and the bipolar disorder can mean that the occurrence of these disorders in the family provides a clue. Finally, there is the response to medication, which is clearly not a diagnostic criterion, but it can be an indication of the accuracy of the diagnosis. When looking at the concurrence of ADHD and the bipolar disorder, compared to ADHD alone, more and more severe comorbidity is observed, among it oppositional and antisocial behavior, anxiety, and alcohol abuse. In 88 % of ADHD cases with a bipolar disorder, bipolar disorder type II occurs. The severity of ADHD symptoms is greater than in the case of ADHD only. Functioning is worse; there are more depressive episodes, more suicide attempts, and aggression. There is a shorter duration of well-being between the episodes of the mood disorder. The mood disorder thereby runs a more chronic course: because of the frequent mood swings associated with ADHD combined with the bipolar disorder, fewer normophoric episodes occur, or the normophoric episodes disappear all together (Wilens et al. 2003a, b).

Patients who are difficult to treat and who have complex problems and a chronic course might have a combination of ADHD and a bipolar disorder (and other disorders) and should be tested for these.

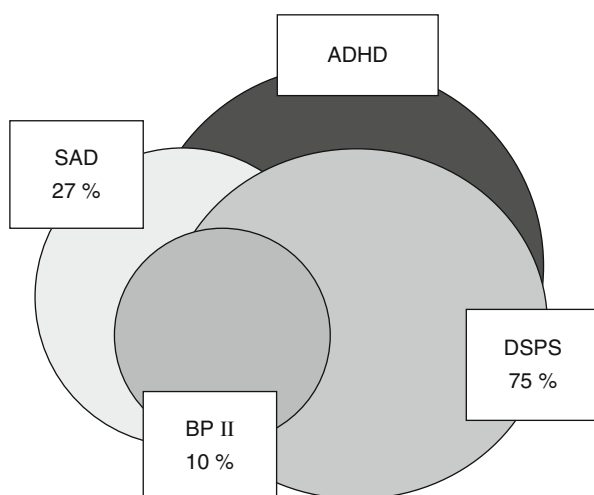
During treatment, differential diagnostic problems could occur in patients with ADHD and a depressive episode: if after remission of the depression, the patient becomes more active, this could look like (hypo)manic behavior. The question then is whether the patient and partner feel that he or she “has always been this way” in periods without depression. However, if the behavior is more overactive than normal, this might fit in with a (hypo)manic episode.

ADHD and bipolar disorder often coincide: about 20 % of bipolar II patients have ADHD, and 10 % of adults with ADHD have a bipolar disorder (almost always type II). The combination increases the chance of suicidal tendencies and chronicity.

### Differentiation Using Neuroimaging and Neuropsychology

An initial neuroimaging study into the brain volume of adult patients with ADHD, a bipolar disorder, the combination, and normal controls showed that ADHD and bipolar disorder can be distinguished from each other. In ADHD, the neocortex was smaller, in particular the prefrontal cortex and the anterior cingulate, as well as the gray matter volume and the cerebellum. In bipolar patients, the thalamus was enlarged, and the left orbitofrontal volume was reduced. In patients with ADHD and bipolar disorder, the abnormalities of both disorders were found. These results suggest that each disorder contributes to changes in the brain volume in its own way (Biederman et al. 2008b).

In research among adolescents with a bipolar disorder with ( $n=11$ ) and without ADHD ( $n=15$ ), an fMRI scan was carried out during a Continuous Performance Test. There was less activation of the ventrolateral prefrontal cortex and of the anterior cingulate cortex and more activation of the posterior parietal cortex and central temporal gyrus in comorbidity with ADHD (Adler et al. 2005). In this study, it was also possible to differentiate both disorders using neuropsychological and fMRI tests. Both test methods are unavailable in clinical practice, but they do give an initial impression of objectivized differences between ADHD and the bipolar disorder (Fig. 2.1).



**Fig. 2.1** Concurrence of ADHD and delayed sleep phase syndrome (DSPS), seasonal affective disorder or winter depression (SAD), and bipolar II disorder (BP II)

## Suicidal Tendencies

The chance of suicidal tendencies in adolescents and adults with ADHD compared to controls is elevated mainly in the presence of hyperactivity/impulsivity, depression or dysthymia, and the antisocial behavioral disorder (Barkley and Fischer 2005; Semiz et al. 2008). In research, among adolescents 36 % of the patients with ADHD had suicidal thoughts before the age of 18, versus 22 % of a control group. For suicide attempts, these numbers were 16 % versus 3 %. After the age of 18, the differences between suicidal thoughts and suicide attempts remained, though they were less clear (Barkley and Fischer 2005). More research into differences in suicidal tendencies in adults with ADHD compared to normal controls is necessary.

### ***2.15.6 ADHD and Anxiety***

The lack of oversight in ADHD often leads to anxiety and panic if a patient loses their keys or has lost track of time again. This panic clearly depends upon the situation in which the oversight or the organization is lacking. Often, these patients do not meet the criteria for a real panic disorder. The panic is more a result of chaos. However, if there are physical anxiety symptoms such as palpitations or hyperventilation or if patients avoid situations as a result of anxiety or are extremely worried, an anxiety disorder should be considered. Common diagnoses in ADHD are anxiety disorder NOS, panic disorder, (social) phobia, and generalized anxiety disorder.

#### **2.15.6.1 ADHD, Fear of Failure, and Perfectionism**

Patients with the subtype of ADHD with attention problems only (also called ADD) have frequently developed a compulsive coping style. They often do not have an overview of tasks and try to manage chaos that continues to arise as a result of forgetfulness by using extra control. This is appropriate and understandable, but the coping style can become a harness in the long run, from which it is difficult to escape by both patients and the people around them. The compulsiveness or perfectionist style should be distinguished from an obsessive compulsive disorder (OCD). This can be done by asking the patient what will happen if the control cannot be used or the ritual cannot be performed. If irritation arises because of the resulting chaos, this will fit AD(H)D more; if there is anxiety or panic, OCD should be considered first. Of course, the criteria for both disorders should then be checked.

Fear of failure or anticipation anxiety occurs very frequently in AD(H)D and appears to be associated with a history of experiences of failure in many areas. It is often a real fear, which diminishes only with the treatment of the ADHD, and the consequent positive experiences in the areas of education, work, and relationships.

### 2.15.6.2 ADHD and Anxiety Disorders

Adults with ADHD in 26–63 % of cases also have one or more anxiety disorders (Biederman et al. 1993; Kooij et al. 2004). In American population research, an anxiety disorder is found in 51 % of those with ADHD, and the chance of anxiety disorders in ADHD is 7.5 times higher than normal in the Belgian population (De Ridder et al. 2008; Kessler 2007). Here, it is often generalized anxiety disorder, panic disorder, PTSD, and social phobia. Vice versa, ADHD is diagnosed in 17 % of patients with anxiety disorders in population research in the United States and in 20–33 % of clinical populations of patients with anxiety disorders (Chao et al. 2008; Fones et al. 2000; Roodbergen 2010; Van Ameringen et al. 2011).

Anxiety disorders, especially when they coincide with physical anxiety symptoms, should always be treated before the ADHD. This is because stimulant drugs have tachycardia or palpitations as a side effect, which are immediately experienced by people with (a history of) anxiety complaints as a return of anxiety or panic. This experience will be so uncomfortable that these patients will never want to use a stimulant drug again. In order to prevent this from happening, the anxiety disorder needs to be diagnosed and treated before the treatment with medication for ADHD. The fastest way to treat the anxiety disorder, based on clinical experience, is with an SSRI, which will generally decrease the physical anxiety complaints within a few weeks. Afterward, a stimulant drug can be added to the SSRI, without this time anxiety being triggered. As far as is known, there is no experience with cognitive behavioral therapy in relation to the effect of anxiety-increasing side effects of stimulant drugs. Some patients will need both treatments in order to get the anxiety under control.

Differentiation of anxiety disorders and ADHD is not that difficult if we are dealing with an episodically occurring anxiety disorder. After all, just on the basis of the course (chronic versus episodic), ADHD can be distinguished from an anxiety disorder. It becomes more complicated when faced with the common generalized anxiety disorder, which has a much more chronic course and an early onset age, and has a lot of overlapping characteristics with ADHD (such as irritability, concentration problems, worrying). If anxiety symptoms are present, the patient is served best by establishing this; an anxiety disorder should after all be treated first. If there is also chronic hyperactivity, attention problems, and impulsivity, the comorbid diagnosis ADHD should be considered.

Anxiety disorders and ADHD often occur together. The anxiety disorders that occur are mainly social phobia, generalized anxiety disorder, PTSD, and panic disorder.

### 2.15.6.3 ADHD and PTSD

Traumas and PTSD often occur in ADHD. In childhood, both disorders can be difficult to distinguish because both can manifest themselves in irritability and

concentration problems. This problem, for example, manifests itself in sexually abused children who develop PTSD but also have an elevated chance of ADHD (Nickel et al. 2004; Weinstein et al. 2000). One question is whether ADHD characteristics can increase sensitivity to traumatization. As a result of, for instance, inattention and doing things without thinking, there is not only a greater chance of accidents, but one can also end up in more risky situations unexpectedly. Seeking out sensation, thrill seeking, can contribute further to these risks. Furthermore, parents of a child with ADHD have an elevated chance of ADHD themselves, making them less able to provide structure and safety and thereby increasing the chances of irritation and violence within the family. Research does point to an elevated chance of both being a perpetrator and repeatedly being a victim in patients with ADHD (Bogaerts 2009). In the combination ADHD and bipolar disorder, the chance of being a victim is elevated even more (Wozniak et al. 1999). In comparative research among veterans with PTSD and veterans with a panic disorder, ADHD was more often found in the PTSD group (36 % versus 9 % in childhood and 28 % versus 5 % in adulthood) (Adler et al. 2004). The cannabinoid receptor gene (CNR1) has recently been associated with an elevated risk of ADHD and possibly also PTSD (Lu et al. 2008). However, much is still unclear; the associations between ADHD and PTSD need to be researched further.

## ***2.15.7 ADHD and Addiction***

### **2.15.7.1 ADHD and Smoking**

Adolescents with ADHD smoke twice as much as controls. An explanation that is assumed is that the relative dopamine deficiency in ADHD needs to be compensated for using the dopamine agonist nicotine. ADHD patients have a good reason for smoking because they often already notice at a young age that this has an effect on their unrest and concentration problems. Smoking can therefore be seen as a form of self-medication in ADHD.

ADHD adolescents start smoking at an earlier age and have more difficulty giving up smoking later on. Treatment of ADHD appears to be able to postpone the early onset of smoking (Huizink et al. 2009). Smoking has been shown to be a risk factor for alcohol and drug abuse (Wilens et al. 2007). A linear relationship between the number of self-reported inattentive and hyperactive/impulsive symptoms and smoking has been found in adolescents. After checking for comorbidity, the chance of smoking increases with each ADHD symptom. In those who smoke, ADHD symptoms are associated with an earlier onset of smoking and with more smoking (Kollins et al. 2005).

Expectant mothers who smoke during pregnancy have an increased chance of having a child with ADHD, and there appears to be an interaction with certain genotypes in the child (DRD4, DAT1) that increase the severity of the ADHD (Linnet et al. 2003; Neuman et al. 2007). On the other hand, mothers who are unable to stop



smoking during pregnancy have an elevated chance of having ADHD themselves, thereby increasing the genetic risk of ADHD for the child (Milberger et al. 1997). There are indications that both factors, the hereditary and the nicotine factor, contribute to the chance of ADHD in the child in their own way.

An acute and dose-dependent effect of methylphenidate is an increase in the number of cigarettes smoked (Rush et al. 2005). Some fear that treatment with methylphenidate can induce nicotine addiction. Initial research did not show this: methylphenidate did not induce a nicotine addiction and was possibly associated with a later onset of nicotine use (Huss et al. 2008). Clinical experience shows that chronic smokers with ADHD who are treated with a stimulant drug have a better chance of successfully quitting smoking, but they do need support and sometimes the dopaminergic antidepressant bupropion hydrochloride, which is registered for this indication (Upadhyaya et al. 2004).

People with ADHD smoke twice as much as normal, start earlier, smoke more, and have difficulty giving up smoking. The severity of the ADHD predicts the number of cigarettes per day.

### 2.15.7.2 ADHD and Addiction to Alcohol and Drugs

The risk of addiction to alcohol, cannabis, and all kinds of other drugs is strongly increased in ADHD. Comorbidity with conduct disorder, antisocial personality disorder, an eating disorder, bipolar disorder, as well as leaving school early and neglect increases this chance (Kollins et al. 2008; Upadhyaya 2008; Wilens et al. 2008). Adolescents with ADHD start abusing alcohol and drugs at a younger age, and around the age of 40, there is an additional increase in substance abuse compared to controls (Wilens et al. 1997). This is possibly associated with giving up hope of improvement of the complaints. Adults with ADHD do not use a particular substance, but all substances (Carpentier 2002). In the addiction treatment sector, ADHD is found in both hard drug and soft drug users and also among alcohol addicts. In psychiatric care, where hard drug use is selected for, mainly cannabis and alcohol abuse are found. All substances have in common that they have an effect on the dopamine system, also called the reward system. Just like with nicotine, there appears to be a form of self-medication in patients with ADHD who abuse substances. Patients indicate themselves that they become quiet, relaxed, or more focused when using alcohol or drugs or that they cannot sleep or function without them. Cannabis appears to fulfil an important function in the chronic sleep phase problems of ADHD patients (refer page 60), and cannabis abuse is therefore possibly a persistent addiction. In literature, there is only one study into the effect of cannabis on melatonin levels, and these increased strongly under the influence of cannabis (Lissoni et al. 1986). More research into the effects of cannabis and melatonin on sleeping problems in ADHD is necessary.



Addiction has a negative effect on the course of ADHD and the quality of life. Because of memory problems in addicts and because of the DSM-IV criteria for children being too strict for adults (refer page 10), it can be extra difficult to obtain enough characteristics to meet the criteria for diagnosing the disorder. The memory problems are associated with cognitive damage as a result of substance abuse. On the other hand, the substance abuse can imitate the ADHD symptoms, resulting in overdiagnosis. The aim is to establish an early onset and lifelong course of ADHD symptoms as well as possible, in addition to the onset, nature, and severity of the substance abuse, in order for patients with this comorbidity to be able to receive an appropriate treatment (Levin and Upadhyaya 2007).

In alcohol and/or drug addicts, a conservative estimate of the prevalence of ADHD is around 20–30 % in the Netherlands and in the United States (Glind et al. 2004; Goossensen et al. 2006; Schubiner et al. 2000; Wilens 2007; Wilens et al. 1994, 2007; Wood et al. 1983). In ADHD and addiction, the mental health-care professional should consider an elevated chance of other psychiatric disorders such as anxiety, depression, bipolar disorder, and personality disorders (Wilens et al. 2005). The addiction in patients with ADHD has a more severe and chronic course than an addiction without this disorder (Wilens 2007).

Because of the fear of an increase in addiction if addicts who have ADHD are treated with stimulant drugs, mental health-care professionals have up until now been reluctant to prescribe medication. There are however no indications that treatment of ADHD with stimulant drugs increases the chance of addiction, but there are indications of an increased chance of diversion of the stimulant drugs in the general population by patients and family members (Carpentier 2007; Faraone and Upadhyaya 2007; Wilens et al. 2003b). The non-stimulant drug atomoxetine is recommended in addicted patients with ADHD but appears to be less effective than stimulant drugs (Upadhyaya 2008). Long-acting stimulant drugs with a decreased chance of abuse are being developed, among them a methylphenidate patch and lis-dexamphetamine, which has been registered in the USA for ADHD. The blocking of the dopamine transporter (DAT) by methylphenidate occurs in the same way in positron emission tomography (PET) studies among ADHD adolescents with and without addiction, giving the go-ahead for more neurobiological research into the use and need of stimulant drug use in addicts with ADHD (Szobot et al. 2008).

ADHD patients are more often addicted to alcohol and drugs than normal, and they start with this at an earlier age. Addicts with ADHD have more comorbidity, and their prognosis is worse than that of addicts without ADHD. Treatment with stimulant drugs can prevent addiction in adolescents with ADHD. Stimulant drugs themselves are not addictive when long-acting preparations are used.

### **2.15.8 ADHD and Personality Disorders**

ADHD and personality disorders overlap in terms of certain characteristics, and they can occur simultaneously in a patient and thereby lead to diagnostic confusion. In ADHD, this is a lifelong pattern starting in childhood with the typical characteristics of hyperactivity, impulsivity, and attention problems. In personality disorders, there is also a chronic pattern of complaints, which cannot result in the diagnosis of personality disorder before adolescence. There is still little research which has focused on both diagnoses in a patient population. The combination of ADHD and a personality disorder usually also generates more comorbidity on axis I, in particular anxiety, depression, addiction, and sometimes criminality. Most research into ADHD has been performed on cluster B personality disorders. In all research into cluster B personality disorders, a high prevalence of ADHD in the medical history is found, ranging from 33 to 65 %. This raises the question as to whether ADHD precedes personality disorders or whether the diagnosis ADHD was missed in adult psychiatric care, where they are more familiar with diagnosing personality disorders than adult ADHD.

In German research into 118 women with a borderline personality disorder, 41 % of the women had a history of ADHD in childhood, and in 16 %, ADHD was still present. In this group of patients, ADHD had been correlated with emotional abuse in childhood, with more comorbidity on axes I and II and with more severe borderline symptoms (Philipsen et al. 2008). Similar results were found in Italian research (Fossati et al. 2002). In Dutch research in 103 borderline patients that has not yet been published, ADHD was also found in 33 % (van Dijk et al. 2011, 2012). In a Turkish study among 105 male detainees with an antisocial personality disorder (ASP), ADHD was established in 65 %. Comorbidity with ADHD coincided with neglect, and a more serious form and earlier onset of auto-mutilation, suicide attempts, and psychopathy than those without ADHD (Semiz et al. 2008). These data are a strong recommendation for carrying out a focused assessment into ADHD on all patients with a borderline or antisocial personality disorder and, if this disorder is diagnosed, for then treating it.

Of the patients with cluster B personality disorders, 33–65 % have a history of ADHD in childhood.

#### **2.15.8.1 Cluster B Personality Disorders in ADHD**

A borderline or antisocial personality disorder was also diagnosed in 6 % of 53 adults with ADHD in a study that used a structured interview for cluster B personality disorders (Kooij 2006). In 25 % subclinical diagnoses of these personality disorders were diagnosed. In accordance with the data from follow-up studies in children,

the development of cluster B characteristics coincided with a history of oppositional defiant and/or aggressive behavior in childhood (Biederman et al. 2008). Furthermore, an overlap was found with the two criteria “mood swings” and “inadequate anger” of the borderline and antisocial personality in 90 % of the ADHD patients. Impulsivity is the third overlapping symptom. Because health-care providers are unfamiliar with the diagnosis of ADHD in adults, the overlap of the three symptoms, impulsivity, mood swings, and outbursts of anger, can easily lead to the diagnosis of borderline or antisocial personality disorder, without the (differential) diagnosis of ADHD having been considered. Considering both diagnoses can be in the interest of treatment. If characteristics of the cluster B personality disorders that are difficult to treat can be labeled in diagnostic assessment as symptoms associated with ADHD, this can after all open up new perspectives for treatment.

Follow-up studies of adolescents with ADHD have also shown that the chances of developing a personality disorder later on are elevated, in particular borderline (odds ratio 13.16), antisocial (odds ratio 3.03), evasive (odds ratio 9.77), and narcissistic personality disorder (odds ratio 8.69) (Miller et al. 2008).

Using research into personality dimensions by Cloninger (the Temperament and Character Inventory) in adults with ADHD, it has become clear that the combined type of ADHD and hyperactivity/impulsivity is correlated with higher scores on *novelty seeking* and *persistence* and lower scores on *cooperativeness*, while the inattentive type of ADHD shows more correlation with *harm avoidance* and *self-directedness* (Salgado et al. 2009). More research into the backgrounds of these clinically recognizable differences between the subtypes of ADHD is necessary.

Initial open-label research shows an effect of methylphenidate on the treatment of adolescents with borderline personality disorder and ADHD. Not only did the severity of the ADHD symptoms decrease on treatment with methylphenidate, but the severity of the borderline characteristics and the aggressive behavior did too (Golubchik et al. 2008). Controlled research into these effects is necessary.

In ADHD, the chance of (cluster B) personality disorders is increased.

### 2.15.8.2 Differentiating ADHD and Personality Disorders

Table 2.9 gives an overview of the overlapping and distinguishing characteristics of ADHD, cluster B personality disorders, and the bipolar disorder. In reality, the disorders are distinguished on the basis of symptoms, course, and age of onset of the disorder. The cluster B personality disorders overlap with ADHD in terms of impulsivity, frequent mood fluctuations (4–5 times a day), and outbursts of anger or irritability. ADHD coincides with unrest or hyperactivity and attention problems, but these symptoms are not part of the personality disorders. ADHD has an earlier onset (in childhood) than personality disorders (in adolescence).

**Table 2.9** Differences and similarities between ADHD, bipolar disorder, and borderline personality disorder

| Symptoms and course      | ADHD              | Bipolar                       | Borderline |
|--------------------------|-------------------|-------------------------------|------------|
| Mood swings, irritable   | X                 | X                             | X          |
| Frequency of mood swings | 4–5×/day          | 2–3 days                      | 4–5×/day   |
| Overactive, hyperactive  | X                 | X                             | –          |
| Impulsive                | X                 | X                             | X          |
| Attention problems       | X                 | X                             | –          |
| Increased associative    | X                 | X                             | –          |
| Megalomaniac tendencies  | –                 | X                             | –          |
| Sexual disinhibition     | –                 | X                             | –          |
| Onset childhood          | X                 | +/-                           | –          |
| Chronic/episodic course  | Chronic           | Episodic                      | Chronic    |
| Family history           | Positive for ADHD | Positive for bipolar disorder | ?          |

Research into the antecedents of personality disorders appears to provide more and more evidence for overlap and comorbidity, in the sense that personality disorders are often preceded by behavioral disorders in childhood, among them ADHD (Soderstrom et al. 2005). A history of sexual abuse, violence, or neglect in childhood increases the chance that a cluster B personality disorder (also) needs to be diagnosed. It is important to not reject the ADHD diagnosis too quickly, simply because a cluster B diagnosis can be made. On the other hand, an ADHD diagnosis does also not exclude the cluster B diagnosis. A history of neglect does not exclude ADHD (in the family); both problems can reinforce each other, especially when a *conduct disorder* or personality disorder is also present in the parents. The importance of a careful diagnostic assessment lies in the consequences of both diagnoses for the treatment. Treatment of ADHD can produce results quickly, and the decrease in impulsive behavior and irritability can benefit the psychotherapeutic treatment for the personality disorder.

In women with both a borderline personality disorder and ADHD neurochemical deviations and deviations in the volume of the corpus callosum have been found in comparison to controls, using functional magnetic spectroscopy and MRI scans, respectively. Glutamatergic changes in the anterior cingulate cortex were associated with both disorders (Rusch et al. 2007, 2008). Unfortunately, these studies do not show to which of the two disorders these changes should be attributed.

Using neuropsychological research, it was possible to distinguish between ADHD and the borderline personality disorder, in particular in the area of inattention or attention problems. Attention problems are indeed not symptoms of the borderline personality disorder. The working memory, various motor and cognitive inhibition functions, and behavioral problems were researched. ADHD patients performed worse than borderline patients on two inhibition tasks (stop signal task and the conflict module of the attentional network task (ANT)). Their response times were also longer, and there was more intra-individual variance in almost all attention tasks. The borderline group hardly differed from normal controls in performance on the neuropsychological tasks, but there was overlap with ADHD on behavioral problems. The ADHD group was generally in worse shape (Lampe et al. 2007).

Overlapping characteristics of ADHD and cluster B personality disorders are impulsivity, mood swings, and outbursts of anger.

### 2.15.8.3 Antecedents of Cluster B Personality Disorders

Ten years of follow-up studies in children with ADHD and comorbid behavioral disorders have shown that the oppositional defiant disorder (ODD) remained in a minority. However, ODD in childhood is associated with depression after 4 and 10 years of follow-up, and ODD increased the risk of conduct disorder (CD) and antisocial personality disorder (ASP). CD itself will do this even more strongly. CD also strongly increases the chance of substance abuse, bipolar disorder, and smoking (Biederman et al. 2008b, c).

Also, in research in adults with a history of ADHD and CD, a similar pattern of comorbidity emerges, in particular cluster B personality disorders (Dowson 2008). There is therefore a characteristic pattern of ADHD and behavioral disorders (ODD and CD) in childhood, which increases the chance of the development of cluster B personality disorders in adulthood.

### 2.15.8.4 ADHD and Sexual Abuse

Little research has been done into the relationship between ADHD and sexual abuse in adults. It is conceivable that ADHD and the often associated behavioral disorders in the family together can increase the chances of aggression and violence, among them sexual violence. Here, we are dealing with impulsivity, need for sensation, lack of consideration, irritability, defiant and aggressive behavior, and, in the case of an associated bipolar disorder, possible also sexual disinhibition. Such comorbidity could lead to an explosive mixture. Because of the hereditary nature of these disorders, both perpetrator and victim could have characteristics that increase the chance of abuse. This is however merely a hypothesis which needs to be researched further. However, research has shown that children who are sexually abused have a 14–46 % chance of ADHD. Conduct disorder (CD) also occurs more in this group (McLeer et al. 1994; Merry and Andrews 1994). Research among more than 14,000 adolescents shows that children with ADHD inattentive type have a 2.6 times increased chance of sexual abuse and twice as high a chance of physical neglect (Ouyang et al. 2008). Sexual abuse occurred more often in a group of 144 girls with ADHD (14.3 %) than in a matched control group (4.5 %). In this research, sexual abuse occurred more in the combined type ADHD than in the inattentive type (Briscoe-Smith and Hinshaw 2006).

In initial research into sexual abuse in adults with ADHD compared to controls, a questionnaire on traumas in childhood was used. Emotional neglect and abuse occurred more often in ADHD patients than in controls. Sexual abuse and physical

neglect occurred more often in women than in men with ADHD (23 % versus 12.5 %). Sexual abuse was associated with anxiety and depression later on in life, but ADHD turned out to be an even better predictor of severe psychosocial dysfunctioning in adulthood (Rucklidge et al. 2006). In Dutch research among 54 adults with ADHD, a history of sexual abuse in childhood was found in 18.5 % of the total group, but in 30 % of the women. This number is similar to that of the previous study on ADHD and to the percentage of sexual abuse in other psychiatric disorders (Bryer et al. 1987; Kooij 2006). Women with ADHD and sexual abuse in their history more often had bulimia nervosa and more aggressive behavior throughout life; they less often had paid work and had more characteristics of the borderline personality disorder than women with ADHD without a history of abuse (Kooij 2006). These two studies therefore indicate a higher frequency of sexual abuse in the history of adults with ADHD, in particular women. It was already known from literature that a history of sexual abuse leads to an increased chance of the development of a borderline personality disorder (Zanarini et al. 1997, 2005); a similar history in adults with ADHD can help to establish comorbidity with a cluster B personality disorder.

Sexual abuse occurs in at least 14 % of children with ADHD and is reported by 18.5 % of adults and 30 % of women.

### **2.15.9 ADHD and Criminality**

Psychiatric disorders, among them ADHD and behavioral disorders, appear to occur very often in delinquent adolescents and adults (Einat and Einat 2008; Rasmussen et al. 2001; Vermeiren et al. 2000; Vreugdenhil et al. 2004). Most research has been done in men, but female delinquents who were examined for ADHD also had a lifetime ADHD diagnosis in 25 % of cases, whereby 10 % still met all the criteria in adulthood. The women with ADHD had more comorbidity, were younger at the time of their conviction, and were given more severe punishments compared to women without this diagnosis (Rosler et al. 2008). Because adult ADHD is not covered in psychiatric training programs, knowledge about diagnostic assessment and treatment is often insufficient in (forensic) psychiatry. Because treatment of ADHD and other disorders in delinquents could reduce the chance of recidivism, it is in the interest of society that this knowledge be gained.

Prospective studies carried out over 30 years in boys with ADHD and behavioral disorders compared to controls show that hyperactivity is significantly associated with arrests, conviction, and prison sentences. Antisocial behavior in childhood, socioeconomic status, and IQ predicted adult criminality. Boys who were treated intensively for 3 years in childhood for ADHD did not perform better than those who had only had medication. Hyperactivity without behavioral problems however

did not lead to an elevated risk of criminality later in life (Satterfield et al. 2007). This research also shows that short-term treatment in childhood is insufficient for preventing such a course. Other prospective follow-up studies into criminality in boys with ADHD compared to controls also showed ADHD boys being arrested (39 % versus 20 %) and convicted (28 % versus 11 %) significantly more often, and it showed they had been sentenced to prison more often (9 % versus 1 %).

Conduct disorder or antisocial behavior predicts the elevated risk of criminality, whether combined with addiction or not. ADHD in itself is not unilaterally associated with criminality, but the often coinciding behavioral disorder/antisocial personality disorder mediates the relationship with criminality (Mannuzza et al. 1998). Still boys with ADHD without associated behavioral disorders can go through a criminal development at a later age, as other research shows. This however is associated with a coinciding antisocial development and with addiction during adolescence (Mannuzza et al. 2008). Of all ADHD symptoms, hyperactivity/impulsive behavior in particular, but not inattention, predicts criminality later on in life (Babinski et al. 1999).

Genetic research in children with ADHD repeatedly points toward a relationship of the COMT valine/methionine polymorphism on codon 158 (COMT Val158Met) and aggressive behavior. Children that are homozygotic for the val/val genotype had more conduct disorder symptoms, were more aggressive, and had more often been convicted for criminal acts compared to carriers of the met allele (Caspi et al. 2008). More research is needed into the relationships between specific genes, behavioral disorders, and criminality.

Hyperactivity combined with behavioral disorders and addiction increases the chance of criminality.

### 2.15.9.1 ADHD in Sexual Delinquents

ADHD occurs more in sexual delinquents compared to controls (14 % versus 8 %). Research showed that 65 % of sexual delinquents had psychiatric disorders. It is notable that the criminality started 10 years earlier in those with ADHD in childhood and that they had been convicted more often (Blocher et al. 2001). In other research into sexual delinquents, out of all psychiatric disorders, only childhood ADHD turns out to be associated with paraphilia and with socially deviant and aggressive forms of sexually impulsive behavior (Kafka and Prentky 1998). In other research, ADHD occurred in 43 % of men with paraphilia. The comorbidity mainly related to conduct disorder, mood disorders, and cocaine addiction (Kafka and Hennen 2002). ADHD appears to be a risk factor for the severity of the sexual delinquency in convicted men with comorbidity. Little is still known about the treatment of this group. In a treatment study among 26 men with ADHD, mood disorders, paraphilia, and associated disorders who responded insufficiently to treatment with



either a stimulant drug or an SSRI, an SSRI or stimulant drug was added to the treatment, respectively. Outcome measures were the severity of the ADHD, the mood disorder, and the paraphilia. Addition of the SSRI was significantly effective for the decrease of behavior associated with paraphilia. Addition of the stimulant drug was associated with an increased effect on the paraphilia, the mood, and the ADHD symptoms (Kafka and Hennen 2000).

### ***2.15.10 ADHD and Autistic Spectrum Disorders (ASD)***

ADHD is not the only child psychiatric or developmental disorder that does not seem to go away in adulthood; this also applies, among others, to behavioral disorders (although in adulthood these are often called personality disorders) and to autism and autism-related disorders, also called autistic spectrum disorders (ASD). Among these are the pervasive developmental disorders such as PDD-NOS and Asperger syndrome. In autism, we are dealing with a multifactor hereditary contact disorder that can be manifested in a lack of empathy, problems in reciprocity in interactions, being odd or peculiar, having difficulty integrating information, being withdrawn, repeated stereotypical movements or behavior, persevering, rigidity, difficulty with change, and being easily overstimulated. Two-thirds of those with an autistic disorder are mentally retarded (van Berckelaer-Onnes 2004). Scientific interest in autistic people with normal or high intelligence has developed only during the last few years. The prevalence in children (and adults) is now estimated at more than 1 % on the basis of English population research; before, the estimates were lower. Here, a distinction is made between strict (0.4 %) and slightly looser definitions of autistic disorders (0.8 %). It is unclear whether the increase in the prevalence is the result of a better recognition, more inclusive diagnostic criteria, or an increase in the incidence. In any case, these children and adults have contact problems that deserve attention and care (Baird et al. 2006).

Recognition of autistic spectrum disorders in psychiatric care often leaves something to be desired; this subject should also be included in the psychiatric training programs. Diagnostic instruments are the Autistic Diagnostic Observation Schedule (ADOS), the Autistic Diagnostic Interview-Revised (ADI-R), and the Diagnostic Interview for Social and Communicative Disorders (DISCO) (Kan et al. 2008). The comorbidity in autistic spectrum disorders varies, but the largest group is made up of associated schizophrenia or psychosis (Mouridsen et al. 2008).

#### **2.15.10.1 Overlap and Differences Between ADHD and ASD**

Autistic spectrum disorders often coincide with ADHD symptoms. In twin research in children in the general population, considerable correlations (.54) were found between children with ADHD symptoms and autism, not only with respect to questionnaire data on the phenotype of parents and teachers, but also in the area of



genetics. There was also a substantial overlap of both disorders: 41 % of the children with autistic spectrum disorders also had many ADHD characteristics, and 22 % of those with ADHD characteristics also had the diagnosis autistic spectrum disorder. These data suggest a joint genetic influence in both disorders (Ronald et al. 2008). In other twin research in the general population, the occurrence of autistic characteristics in children with and without ADHD was researched. Children with the inattentive and combined subtypes of ADHD had significantly more autistic characteristics than children without ADHD (Reiersen et al. 2007). Because of a lower cutoff point for girls, more girls reached the threshold for autistic characteristics than boys. The cutoff point for girls was lower because girls generally have more highly developed social skills than boys. In research into children with ADHD, their siblings and controls, more autism characteristics were found in children with ADHD, in particular the combined type ADHD, and in boys in general. Autism characteristics turned out to run in the family, and this happened more often when two children in a family had ADHD. Of the correlation between ADHD and autism in boys, 56 % could be attributed to joint genetic family influences (Mulligan et al. 2009). This relationship was however not found in girls with ADHD and autism characteristics. Other notable findings were the fact that higher autism scores coincided with more other comorbidity, as well as the ADHD. For example, children with ADHD and higher autism scores showed more oppositional behavior (ODD), conduct disorder (CD), mobility disorders (clumsiness), and problems with language development, similar to Gillberg's concept "deficits in attention, motor control, and perception" (DAMP) (Gillberg 2003).

In the DSM-IV, the ADHD diagnosis is still dropped when an autistic disorder is diagnosed, even though the ADHD symptoms cannot be found in the descriptions of autistic disorders. Recent research has therefore superseded this strict division between ADHD and autism. For patients, a diagnosis that is not made often means no treatment. The question is whether this is to their advantage.

In terms of the differential diagnosis, it can be tricky to distinguish autistic spectrum disorders from social clumsiness through inattention and impulsive behavior as seen in ADHD. Comorbidity of ADHD with social anxiety, a social phobia, or obsessive-compulsive disorder (OCD) can also make the image more complex. A clinically important difference between an autistic spectrum disorder and an anxiety disorder is that someone with a social anxiety or OCD is not "odd or aloof," but they avoid social situations or show compulsive behavior out of anxiety. Someone with autistic characteristics is not necessarily anxious, but might indicate that social interaction with more than two people is "too much" or that he or she does not understand well what is expected during social interactions. The course of their life shows a socially limited life, but not one of anxiety or avoidance. A social phobia or OCD can be treated successfully, but this has so far not been true for autism. Therefore, it is important that a careful diagnostic assessment be carried out (Cath et al. 2008). Patients with the inattentive subtype of ADHD (or ADD) often suffer from anxiety and depression, which might make them extra slow or inhibited in interactions. Slowness is however different from being "odd" or not quite knowing what is expected in social interactions.

Diagnostic instruments for anxiety, depression, and autistic spectrum disorders can be helpful in untying this diagnostic tangle. If there is doubt about the presence of an autistic spectrum disorder in ADD, and any anxiety or depression, the advice is to first treat the anxiety or depression and the ADD and then to reassess the social interaction.

ADHD and autistic spectrum disorders both have a strong genetically determined background and often occur within the same family. There seem to be dimensional transitions between both disorders rather than a strict division.

### ***2.15.11 ADHD and Gilles de la Tourette or Tics***

Tics and Gilles de la Tourette are all categorized under tic disorders. These disorders start in childhood, run in the family, and are associated with an attack of repeated movements (motor tics) such as blinking of the eyes, twitching of the face, or movements of the neck. Vocal tics are grunting, sniffing, or other sounds. Expressing swear words, as is the case in Gilles de la Tourettes, is fairly rare. In research in children with tics, 39 % also had ADHD, and 40 % had obsessive-compulsive characteristics or disorders (OCD). Twenty percent had both ADHD and OCD. In patients with Tourette ADHD (25–80 %), OCD and the combination occur even more often. This suggests a common basis for all forms of tic disorders and genetic relations with ADHD (Fernandez-Alvarez 2002). Vice versa, tics occur in 50 % of children with ADHD (Kneel and Comings 1993). Tic disorders generally decrease in severity with age, and at the age of 18, half are free of tics. In adults in general, tics persist in about 20 %, but they are often less serious than in children (Leckman et al. 2006).

Therefore, tics seldom are a serious problem in the treatment of adults with ADHD. Adults that used to have tics can however have children with the same disorder. Sometimes adults who used to have tics stutter; this appears to be a last remnant of the tic disorder, which can suddenly disappear when treated with stimulant drugs. In one-third of the children with tics, these increase during treatment with stimulant drugs, but in the majority, the tics decrease, or the severity remains the same. Therefore, it is advisable to try stimulant drugs in ADHD with tics while recording the frequency and severity of the tics (Gadow and Sverd 2006; Palumbo et al. 2004; Poncin et al. 2007). Research has been done into the effectiveness of methylphenidate in adults with ADHD and tics (Spencer et al. 1997, published in Weiss et al. 1999). Of the more than 300 adults with ADHD, 11 % had tics. Those with tics were almost all men, and in 90 %, the tics had started in childhood. The tics started after the ADHD. Those with tics also had OCD more often. Treatment with methylphenidate in the history did not influence the occurrence, age of onset, or severity of the tics.

Tic disorders occur more often in children than adults with ADHD. Treatment with stimulant drugs does not have an adverse effect on the tics in the majority of cases.

### **2.15.12 ADHD and Dyslexia**

Dyslexia or reading disorder occurs in 3–4 % of the population and often occurs together with ADHD. Dyslexia is a disorder in reading or spelling at word level or both. In dyslexia, there are often problems with voicing written language. It is a technical reading problem, not a problem of comprehensive reading, which makes the speed of reading too low. This can adversely affect reading comprehension. Dyslexia is persistent and does not improve with normal extra reading exercises or with remedial teaching alone. The treatment of dyslexia consists of specific training in connecting sound and symbols and learning how to compensate using strategies and (IT) tools. The Dutch organization of health insurance companies advised the Minister of Health in 2007 to include diagnostic assessment and treatment of children with severe dyslexia in the basic health-care package under certain circumstances. As of yet, no provisions have been made for adults with dyslexia in the Netherlands. In many cases, they themselves will have to learn how to deal with and compensate for the problems associated with dyslexia. Dyslexia requires extra attention in order to compensate for reading problems; in the case of attention deficit, the compensation mechanism fails, and more serious reading problems arise. Treatment of the attention deficit with stimulant drugs can improve the compensation in this way, resulting in less disruption caused by the dyslexia (Wasserstein and Denckla 2009). Research among students with severe dyslexia shows that they, more often than controls and in half of all cases, have attention problems, together with anxiety or depression and behavioral problems (Knivsberg and Andreassen 2008).

The diagnostic instruments for dyslexia and learning disorders in general are much less developed in adults than in children, although there is development in this area (Nichols et al. 2009). Dyslexia is often hereditary and therefore occurs in families. There should be a history of a late start with reading, of slow reading with a lot of effort, even after learning how to read. There can be mistakes in writing or sloppy-looking writing. Even when texts are checked, mistakes are often not noticed. Apart from the computer spell-check function, various specific programs have been developed in order to compensate for the problems associated with dyslexia. In ADHD, the attention deficit leads to learning difficulties as a result of not paying attention, having difficulty sustaining attention on tasks (leading to strongly disliking and avoiding homework), problems with the working memory, and eventually underachievement. Of the children and adults with ADHD, 60 % have (had) learning difficulties, and 30 % have had to repeat a class. There are therefore clear differences between the complaints associated with ADHD and those associated with

dyslexia; it is not rare for both to occur in one person, which increases the learning difficulties and underachievement.

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