

CONTINUING MEDICAL EDUCATION

Growing Up Is Hard

Mental Disorders in Adolescence

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SUMMARY

Background: Puberty brings on many biological, mental, and social changes. In this phase of life, the prevalence of serious mental disorders is about 10%.

Methods: This review is based on a selective search for publications on the prevalence, causes, risk factors, and effects of mental disorders in adolescence.

Results: Internalizing mental disorders are more common in girls; these include depression, social anxiety, and eating disorders. Their prevalence ranges from 12% to 23%, depending on the particular diagnostic instruments and criteria that are applied. Disruptive disorders, e.g., disorders of social behavior, are more common in boys, with a worldwide prevalence of approximately 5% to 10%. Marked differences between the sexes appear during puberty. The one-year prevalence of self-injurious behavior is about 14% in boys and 25% in girls. The consumption of legal and illegal drugs is one of the risk-seeking behaviors associated with adolescence.

Conclusion: In routine check-ups and medical office visits, particular attention should be paid to the possibility of a mental disorder. Special outpatient clinics for adolescents can help more young people avail themselves of the existing preventive and therapeutic measures. Early diagnosis and treatment may prevent mental disorders in adulthood and foster age-appropriate development.

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“It’s only in early youth [...] that a man perceives things in all their sharpness and freshness; all the rest of his life he feeds on that experience.” (Hermann Hesse, e1)

Puberty is a set of biological processes marking the transition from childhood to adulthood. Adolescence, on the other hand, is what has been called “psycho-social puberty,” consisting of essential steps in mental and social development. The physical changes of puberty include, among others, a growth spurt, the maturation of primary and secondary sexual characteristics, and the sex-specific redistribution of muscle and adipose tissue. In parallel with this physical development, young people are faced with increasing demands from their parents, teachers, and social environment. The experience of sexuality in its physiological, cultural, and personal dimensions is a further essential element of this phase of life. The typical developmental tasks of adolescence are listed in *Box 1*.

In adolescence, the parents and wider family lose some of their significance as the peer group takes on greater influence. The peer group is particularly influential in such areas as appearance, clothing, leisure activities, and attitude to school, although young people often join peer groups whose values resemble those of their parents (e2). Piercing, for example, is markedly more common in lower social strata than in higher ones (2), and only 9% of adolescents in a recent German survey said that they could hardly get along with their parents, or not at all (2).

Adolescence is commonly divided into early, middle, and late adolescence, from age 11 to 14, 15 to 17, and 18 to 21, respectively. The basic neuroanatomical changes that occur in adolescence include a relative diminution of cerebral gray matter (probably due to synaptic pruning) and an increase of white matter. Adolescence can be said to end when brain development ends, around age 20 (3); in psychosocial terms, the end of adolescence is marked by

The cause of mental disorders

The fact that mental disorders become more common in adolescence is explained by the joint effects of intensive brain reorganization and the increasing demands placed on the individual by his or her social environment.

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the assumption of mature social responsibility in terms of work, partnerships, and parenthood.

This “remodeling phase” is now thought to be characterized by an imbalance between the systems in the brain that are responsible for “cognitive control” on the one hand, and emotion regulation on the other. According to this hypothesis, the so-called affective system, which mainly responds to rewards and to emotional and social stimuli, is molded by the hormonal changes of puberty while the so-called cognitive control system develops continually throughout adolescence and young adulthood. It is thought that, for as long as this process remains incomplete, the limbic system—associated with emotional and motivational stimuli—tends to prevail over the prefrontal cortex, which exercises control functions. This may explain the fluctuations of motivation and mood that are common in adolescence. Although such fluctuations are generally of no pathological significance, the “systems imbalance” of adolescence may also account in large measure for the increasing incidence of affective and impulse-control disorders in this period of life (4).

The influence of brain development on behavior in adolescence should not be interpreted in a biologically deterministic sense; rather, it should be seen as one among several mechanisms in the biopsychosocial conception of the origins of mental disorders in this age group. Clearly, other individual factors, such as genetic predisposition, sex, earlier childhood experiences, peer influences, and familial and societal structures, play major roles as well.

Our purpose in writing this review is to acquaint readers with the concept, based on current scientific understanding, that mental disorders become more common in adolescence largely because of the increased vulnerability of the brain while numerous reorganizing processes are taking place (4), in interaction with the increasing demands that are placed on the individual by his or her social environment. K. R. Eissler (e3) described his adolescent patients as “neurotic at one time and almost psychotic at another.” This, of course, is not literally true, but nonetheless vividly suggests the thoroughgoing and markedly fluctuating mental changes that typify this phase of life (5).

Studies from several countries have shown that one adolescent in five suffers from a mental disorder (6). The BELLA study, which was an investigation of mental health by questionnaire within the framework of a major epidemiological survey of children and adolescents in Germany (KiGGS), revealed mental abnormalities in 24.9% of boys and 22.2% of girls aged 14

BOX 1

Developmental tasks in adolescence*

- Assuming the role of one’s sex
- Accepting bodily changes
- Separating from parents
- Developing a world view
- Constructing future perspectives (vocational training, preparing for university-level education)
- Establishing a peer group

*modified from (1)

to 17; these abnormalities, however, were not necessarily equivalent to psychiatric diagnoses (7).

Learning objectives

The goal of this review is to acquaint readers with

- the neurobiological changes and social challenges of adolescence,
- the sex-specific features of mental illness in adolescence,
- the common mental illnesses in adolescence, and
- the effects of risk-seeking behavior.

The prevalence of mental disorders in adolescence—depressed, or just in a bad mood?

K. R. Eissler viewed adolescence as a period of “stormy and unpredictable behaviour marked by mood swings between elation and melancholy” (e3). This often makes it difficult to tell whether an adolescent is suffering merely from a non-pathological alteration of mood or from a psychiatric disorder. About 40% of the 14- to 15-year-olds in the Isle of Wight Study reported having feelings of unhappiness, while 20% said they had self-confidence crises and 7% said they had suicidal ideas (e4). Recent data from Germany are similar: in a large-scale epidemiological study, 2.9% of adolescents aged 11 to 17 reported engaging in self-injurious behavior or suicide attempts, and 3.8% said they had suicidal ideas (8). Moreover, adolescents have a lesser degree of well-being and a lower quality of life than children. Adolescents experience a diminished quality

The end of adolescence

Adolescence can be said to end when brain development ends, around age 20.

Psychopathological manifestations

Not all of the individual psychopathological manifestations that appear in adolescence can be equated with a psychiatric disorder.

TABLE

The prevalence of mental disorders in children and adolescents aged 11 to 17¹

	Boys % (range)	Girls % (range)
Depressive disorder ²	5.3 (3.5–7.9)	4.6 (3.2–6.4)
Anxiety disorder ³	3.8 (2.5–5.9)	4.2 (2.8–6.1)
ADHD ⁴	2.8 (1.7–4.5)	1.5 (0.7–3.2)
Dissocial disorder ⁵	10.9 (8.4–14.0)	8.4 (6.3–11.2)

¹ Data on 1841 children in Germany, obtained from parents (BELLA Study, 2003–2006) (12). Mental disorders were defined as a score beyond the cutoff of the relevant questionnaire, accompanied by impaired coping with everyday life as assessed by the Strengths and Difficulties Questionnaire [SDQ; e6])
² Center for Epidemiological Studies Depression Scale for Children (CES-DC [e7]) ≥ 16
³ Screen for Child Anxiety Related Emotional Disorders (SCARED [e8]) ≥ 3
⁴ ADHD (attention deficit hyperactivity disorder) rating scale for teachers and parents (FBB-HKS [e9]) ≥ 2
⁵ Child Behaviour Checklist (CBCL [e10])

of life in practically all areas: with respect to their own bodies, school, their mental state, and their families (9). Even so, three-quarters of adolescents in Germany are highly satisfied with their lives (10).

Many longitudinal studies have shown that mental disorders become more prevalent from childhood to adolescence. A large-scale epidemiological study with some 4000 subjects showed that, during this period of life, the prevalence of clinically relevant disorders that impair everyday functioning rises among both boys and girls (11). In most industrialized countries, the prevalence of serious disorders in adolescence is about 10% (Table) (12, e5).

Sad girls, reckless boys—sex-specific aspects

Before puberty, mental disorders are more common in boys than in girls; during puberty and afterward, the reverse holds. In particular, the prevalence of internalizing disorders rises among girls in this phase of life. On the other hand, disruptive disorders are still more prevalent in boys after puberty; but then become more common in girls over the course of adolescence, so that the prevalence gap between the sexes narrows (11). Sex-specific changes in prevalence are attributed to a variety of factors, as will be discussed in the following sections.

The Isle of Wight Study

About 40% of the 14- to 15-year-olds in the Isle of Wight Study reported having feelings of unhappiness, while 20% said they had self-confidence crises and 7% said they had suicidal ideas.

The role of hormones

Recent research findings underscore the importance of sex hormones for brain development (13): Hormones have been found to have both organizing and functional effects. The amygdala increases in volume mainly in pubertal boys, while the hippocampus increases in volume in girls. These volume changes may partly explain the observed sex differences in vulnerability to mental disorders, e.g., depression. Among their known functional effects, specific hormones have been found to activate certain brain areas acutely: Thus, some aspects of cognitive performance have been found to be linked with the menstrual cycle, and estrogen levels are correlated with mood (e11).

Current studies indicate that anorexia nervosa is becoming more common among children (e12, 14); child and adolescent psychiatry services have registered a marked expansion of this patient group. This may be because puberty is occurring at ever earlier ages (e13). Menarche before age 12 is considered a risk factor for anorexia nervosa (e14).

Girls who undergo puberty very early are also at especially high risk for conduct disorder (15), as well as for auto-aggressive acts such as suicide attempts (e15) and self-injurious behavior (e16). Aside from biological factors, these phenomena seem mainly attributable to an inability to cope with the high demands placed on the individual by her social environment.

In contrast, boys whose puberty begins late (pubertas tarda) have a higher risk of mental disorders (e15), as they can develop feelings of inadequacy and suffer from a lack of appreciation by their peers.

Sex-specific risk factors, life events, and coping strategies

Boys, because they more often engage in risky behavior, also more commonly sustain physical injury (including head injury) and the bodily consequences of drug and alcohol abuse; girls are more likely to become victims of sexual abuse (e17). In the Bremen Adolescent Study (16), 62% of boys reported having been physically attacked or injured, and 28% reported having had a serious accident; the corresponding figures for girls were 41% and 24%, respectively. On the other hand, 9.7% of girls, but only 1.7% of boys, said they had been sexually abused. There are also sex-specific differences in coping strategies for difficult life events and situations. While girls tend to worry more and be plagued by fretful thoughts, boys tend to seek distraction in other activities (e18). Girls, however, are better able to find social support and to arrive at a solution by “negotiation” (17).

Sex-specific biological and social factors

Sex-specific biological and social factors during puberty play a major role in the pathogenesis of mental disorders.

Specific disorders that arise, or have their most pronounced manifestations, in adolescence

Internalizing disorders

The term “internalizing disorders” refers to those characterized by withdrawal and impaired quality of life of the individual, without being primarily directed against other people. Disruptive disorders, in contrast, are characterized by expansive behavior that affects others adversely.

Anxiety disorders

According to the findings of the Bremen Adolescent Study, just under 19% of all adolescents have some type of anxiety disorder, most commonly a phobia (18). So-called separation anxiety diminishes in adolescence, but other anxiety disorders tend to appear, including social phobia, agoraphobia, and generalized anxiety disorder. In particular, the increase in social phobia, which is more common in female than in male adolescents, is well explained as a result of developmental processes. On the one hand, adolescents face greater expectations from their social environment; on the other hand, they become increasingly conscious of the possibility of failure, leading to embarrassment. Wittchen et al. (19) found the incidence of social phobia to be twice as high in 18- to 24-year-olds as in 14- to 17-year-olds. More than half of the adolescents surveyed reported having had conditioning experiences that gave rise to a vicious circle of negative experience, avoidance, repeated failure, and increasing anxiety. Social phobia carries the risk of comorbid depression, refusal to go to school, alcohol and drug abuse, and problematic Internet use (20, 21). Social phobia increases an adolescent’s risk of the later development of depression by a factor of 2 to 3 (e19, e20) and the risk of alcohol dependence by a factor of 4 to 5 (e21).

Depressive disorders

The lifetime prevalence of depressive disorders among persons aged 14 to 24 and young adults has been estimated at 12% (22).

Neurobiological explanatory models for the rising prevalence of depression during adolescence generally invoke an imbalance between prefrontal brain areas and the limbic system. Compared to children and adults, adolescents manifest stronger activation of the amygdala in response to emotional stimuli (e.g., facial expressions). Structural MRI studies have, accordingly, shown structural changes in the striatum and corticolimbic areas of depressed adolescents, in particular reduced volume of

BOX 2

Risk factors for mental disorders in adolescence

- **Familial risk factors**
 - Strict upbringing
 - Lack of care and supervision, lack of interest in children’s activities
 - Partnership conflicts between parents
 - Parental separation and divorce
 - Mental illness in parents
 - Criminality of parents
- **Peer-group-related risk factors**
 - Social ties to socially disturbed or delinquent peers
- **Socioeconomic and cultural risk factors**
 - Poverty
 - Deprived living situation and environment (“social hot spot,” cramped accommodations, unemployment, social isolation)
 - Immigrant background

the striatum, amygdala, hippocampus, and prefrontal regions (23, e22).

Depression in adolescence is thought to arise under the influence of both specific and nonspecific risk factors. The specific risk factors include a family history of affective disorders, a negative cognitive style, or a major loss experience, such as the death of a parent, separation or divorce of the parents, or relocation of the household. Negative cognitive styles are characterized by hopelessness, low self-confidence, and pessimistic attributions (“I’m no good at anything,” “Nobody likes me”), among other features. The nonspecific risk factors include poverty, experience of violence, other negative life experiences (e.g., major conflicts in the home, neglect), and social isolation (24) (*Box 2*).

The manifestations of depression in adolescents resemble those seen in adults, rather than in children (*Box 3*). A dysphoric or sad mood may manifest itself as a tendency to withdraw. Depressed adolescents commonly suffer from anhedonia, which they often experience or express as “boredom.” Irritability and agitation (misbehavior, loss of self-control) are more common in

Sex-specific risk factors

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Anxiety disorders

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BOX 3

Manifestations of depression in adolescence

- Diminished self-confidence, self-doubt
- Reduced drive
- Sadness, mood lability
- Melancholic manifestations
 - Apathy, anhedonia, lack of appetite, early-morning awakening, difficulty falling asleep or staying asleep, weight loss
- Psychosomatic symptoms

depressed adolescents than in depressed adults, but weight loss and psychotic symptoms are rarer (25).

Eating disorders

Although eating disorders have recently become more common among children (e14), their incidence is still highest in adolescence (27). In the BELLA study, 23% of 14- to 17-year-olds reported abnormal eating behavior (26), which, however, might not necessarily fulfill all classification criteria of a full-blown eating disorder. About 40% of all new cases of anorexia nervosa arise in early to mid-adolescence (27); the incidence peak of bulimia nervosa is in mid- to late adolescence.

A number of proposed explanations for the rising frequency of eating disorders in adolescence are summarized in *Box 4* (28, e23).

It is now thought that strict dieting may precipitate an eating disorder in a (genetically) vulnerable adolescent. The prognosis of anorexia nervosa in adolescence has markedly improved in recent years, but many former anorexics have other types of mental disorder in adulthood (30). Some of these disorders may be the expression of “biological scars” that are left behind by anorexia-induced hormonal deficits and dysfunctions (e.g., estrogen and thyroxine deficiency, hypercortisolism) during the adolescent phase of brain development (28, e26).

Disruptive disorders

Disorders of social behavior

Disorders of conduct involve repeated violation of the rights of others and/or transgression of societal rules.

Depressive disorders

Neurobiological explanatory models for the rising prevalence of depression during adolescence generally invoke an imbalance between prefrontal brain areas and the limbic system.

Around the world, their prevalence in adolescence has been reported at about 5–10% (11, 12).

The findings of a large-scale, long-term epidemiological study suggest that disorders of conduct tend to have one of two characteristic time points of manifestation: “Early starters” begin to manifest abnormal behavior in childhood, “late starters” in adolescence (e27). Almost 33% of early starters who were studied at age 32 had committed a violent offense in the preceding six years, compared to only 10% of late starters at the same age, even though the prevalence of alcoholism was the same in both groups (20%) (31).

It follows from these data that disorders of conduct arising in adolescence should not be trivially dismissed as “teenage troubles.” Rather, they require effective psychotherapeutic/ child and adolescent psychiatric intervention, with the involvement of as many components of the affected adolescent’s social environment as possible—family, school, and peer group.

Other disorders

Adolescent crises

This term is found in neither the ICD-10 nor the American classification (DSM-IV). “Adolescent crisis” is a pragmatic designation for any of a number of disorders that share the common features of age-dependent onset, (usually) limited duration, and often dramatic manifestations. Adolescent crises can manifest themselves as disturbances of sexual development, as authority or identity crises, as narcissistic crises, or even as depersonalization or derealization phenomena. They can be understood as extreme variants of normal developmental processes. In most cases, the affected adolescent returns completely to normal; rarely, an adolescent crisis is the harbinger of a personality disorder or psychotic disease (32, e28).

Self-injurious behavior

This term refers to voluntary, repeated, direct destruction of bodily tissue that is not performed with suicidal intent and is not socially accepted (33). The most common types of self-injurious behavior are cutting or scraping the skin, hitting oneself, and burns.

Self-injurious behavior usually starts at age 11 to 13 (e29) and peaks in early adulthood. Its one-year prevalence among adolescents in Germany is about 20% (just under 14% in boys, 25% in girls) (WE-STAY Interim Report 2012, www.klinikum.uni-heidelberg.de/fileadmin/zpm/kjupsy/pdfs/WE-STAY-Zwischenbericht.pdf). 5% of

Eating disorders

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adolescents reported having injured themselves repeatedly.

The etiology of self-injurious behavior is not yet fully clear. It is probably closely linked to the hormonal changes of puberty (e16). Self-injurious behavior is seen not only in borderline personality disorder, but also in depression, adolescent crises, and other disorders. It often serves to regulate affect and tension, but it can also be an expression of self-punishment or of a desire for more attention. Although many individuals who injure themselves will never attempt suicide, self-injurious behavior must be regarded as a possible predictor of suicide attempts (34), and any young person manifesting self-injury should be referred to a child and adolescent psychiatrist.

Other serious disorders, such as schizophrenia and bipolar disorders, are relatively rare in adolescence and will not be discussed here in view of the limited space available (e30, e31).

Risk-seeking behavior

One of the typical features of adolescence is that young people tend to seek out dangerous situations and to experiment with behaviors that pose a risk to their health. Adolescent risk-seeking behavior is due, in all probability, to an imbalance between certain brain areas that mature earlier, including the limbic system and the reward system of the ventral striatum, and the so-called control regions, such as the prefrontal cortex, which mature later (13).

Smoking and drinking have become less common among adolescents in Germany in recent years, yet marked differences are seen that depend on the social level. Young people from families of high social status smoke significantly less than their counterparts from families of low social status (35), while the opposite holds for alcohol consumption. The same percentage of boys and girls smoke, while a markedly higher percentage of boys consume alcohol; there is, however, a present trend toward equalization of the sexes (35). Regular cannabis abuse usually starts between the ages of 14 and 18 but is currently diminishing among both boys and girls (e32, e33). Smoking in adolescence “prepares the way” for the later abuse of alcohol and illegal drugs. Substance abuse is associated with elevated rates of depression, anxiety disorders, attention deficit hyperactivity disorder (ADHD), and conduct disorder (e34).

Sexual maturation crises

Sexual maturation crises are common in adolescence (36), although precise figures on their prevalence are not

BOX 4

Explanatory hypotheses for the rising prevalence of eating disorders in adolescence

- Increase of adipose tissue in girls
- Hormonal changes of puberty (e24)
- Societal expectations of increased independence and autonomy that are particularly difficult for anorexic adolescents to meet
- Increased influence of the peer group and its values (thinness as the ideal state) (29, e25)

available. The affected adolescents are unsure about their sexual orientation, i.e., about whether they are homosexual, heterosexual, or bisexual. Generally, boys fear being homosexual more than girls do. Uncertainty over sexual orientation often leads to emotional disturbances, such as depression and anxiety, combined with social withdrawal. In view of the high variability in the development of adolescent sexuality, physicians should be cautious in labelling any particular behavior as deviant.

Overview

In summary, adolescence is a phase in which many psychiatric disorders begin that continue to be relevant in later life. These disorders can interfere with normal development, and they may render the affected young people unable to cope with age-appropriate tasks (schooling, vocational training, becoming independent). Thus, it is vitally important that mental disorders in adolescents should be diagnosed and treated in timely fashion by child and adolescent psychiatrists, psychologists, and/or psychotherapists. Sadly, the opposite is more often the case: The utilization of medical or psychological help by adolescents has been found to be inadequate (37). In Germany, pediatricians offer the so-called J1 checkup, which contains screening questions on drug abuse, eating disorders, and social behavior, but adolescents do not make adequate use of it. In some clinical-practice situations, an assessment by questionnaire may be useful, e.g., with the Strengths and Difficulties Questionnaire (SDQ) (<http://sdqinfo.org>; a

Disorders of conduct

Disorders of conduct involve repeated violation of the rights of others and/or transgression of societal rules. Around the world, their prevalence in adolescence has been reported at about 5–10% .

Adolescent crises

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translated version of the SDQ [e35] was used in the German KiGGS study). Many cases of mental disorders in adolescents cannot, however, be detected with screening questions, but only by a confidential discussion between the patient and the physician. Adolescents, in particular, try to appear “as normal as possible,” and they have great difficulty admitting that they have mental problems. Age-appropriate diagnosis and treatment measures should be undertaken that neither underchallenge nor overwhelm these patients as they make the transition from childhood to adolescence and onward into adulthood. Their need for autonomy and their age-specific “culture” must be recognized, but their families must also be involved in their care. Such measures are very likely to lead to better compliance and thereby to better therapeutic outcomes.

Conflict of interest statement

The authors declare that no conflict of interests exists.

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REFERENCES

1. Oerter R, Montada L: Entwicklungspsychologie, 5th edition. Weinheim: Beltz 2002.
2. Leven I, Quenzel G, Hurrelmann K: Familie, Schule, Freizeit: Kontinuität im Wandel. In: Shell Deutschland Holding (eds.): Jugend 2010. Frankfurt am Main: Fischer Taschenbuch Verlag 2010; 53–128.
3. Giedd JN, Blumenthal J, Jeffries NO, et al.: Brain development during childhood and adolescence: a longitudinal MRI study. *Nat Neurosci* 1999; 2: 861–3.
4. Konrad K, Firk C, Uhlhaas PJ: Brain development during adolescence: neuroscientific insights into this developmental period. *Dtsch Arztebl* 2013; 110 (25) 425–31.
5. Herpertz-Dahlmann B: Psychiatrische Erkrankungen der Adoleszenz. In: Uhlhaas PJ, Konrad K (eds.): Das adoleszente Gehirn. Stuttgart: Kohlhammer 2011; 206–22.
6. Costello EJ, Copeland W, Angold A: Trends in psychopathology across the adolescent years: what changes when children become adolescents, and when adolescents become adults? *J Child Psychol Psychiatry* 2011; 52: 1015–25.
7. Ravens-Sieberer U, Wille N, Bettge S, Erhart M: Mental health of children and adolescents in Germany. Results from the BELLA study within the German Health Interview and Examination Survey for Children and Adolescents (KiGGS). *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2007; 50: 871–8.
8. Resch F, Parzer P, Brunner R, BELLA study group: Self-mutilation and suicidal behaviour in children and adolescents: prevalence and psychosocial correlates: results of the BELLA study. *Eur Child Adolesc Psychiatry* 2008; 17: 92–8.

9. Ravens-Sieberer U, Erhart M, Wille N: Gesundheit in der Adoleszenz. In: Resch F, Schulte-Markwort M (eds.): *Kursbuch für integrative Kinder- und Jugendpsychotherapie. Adoleszenz*. Weinheim, Basel: Beltz 2008; 13–31.
10. Gensicke T: Wertorientierungen, Befinden und Problembewältigung. In: Shell Deutschland Holding (eds.): *Jugend 2010*. Frankfurt am Main: Fischer Taschenbuch Verlag 2010; 187–241.
11. Costello EJ, Mustillo S, Erkanli A, et al.: Prevalence and development of psychiatric disorders in childhood and adolescence. *Arch Gen Psychiatry* 2003; 60: 837–44.
12. Ravens-Sieberer U, Wille N, Erhart M et al.: Prevalence of mental health problems among children and adolescents in Germany: results of the BELLA study within the National Health Interview and Examination Survey. *Eur Child Adolesc Psychiatry* 2008; 17: 22–33.
13. Konrad K. Strukturelle Hirnentwicklung in der Adoleszenz. In: Uhlhaas PJ, Konrad K (eds.): *Das adoleszente Gehirn*. Stuttgart: Kohlhammer 2011; 124–38.
14. Halmi KA: Anorexia nervosa: an increasing problem in children and adolescents. *Dialogues Clin Neurosci* 2009; 11: 100–3.
15. Sontag LM, Graber JA, Brooks-Gunn J, Warren MP: Coping with social stress: implications for psychopathology in young adolescent girls. *J Abnorm Child Psychol* 2008; 36: 1159–74.
16. Essau CA, Conradt J, Petermann F: Incidence of post-traumatic stress disorder in adolescents: results of the Bremen Adolescent Study. *Z Kinder Jugendpsychiatr Psychother* 1999; 27: 37–45.
17. Persike M, Seiffge-Krenke I: Competence in coping with stress in adolescents from three regions of the world. *J Youth Adolesc* 2012; 41: 863–79.
18. Essau CA, Petermann F: Anxiety disorders in children and adolescents. Epidemiology, risk factors and intervention. *MMW Fortschr Med* 1999; 141: 32–5.
19. Wittchen HU, Müller N, Pfister H, Winter S, Schmidt-Kunz B: Affektive, somatoforme und Angststörungen in Deutschland. Erste Ergebnisse des bundesweiten Zusatzsurveys „Psychische Störungen“. *Gesundheitswesen* 1999; 61: 216–22.
20. Burstein M, Ameli-Grillon L, Merikangas KR: Shyness versus social phobia in US youth. *Pediatrics* 2011; 128: 917–25.
21. Lee BW, Stapinski LA: Seeking safety on the internet: relationship between social anxiety and problematic internet use. *J Anxiety Disord* 2012; 26: 197–205.
22. Wittchen HU, Stein MB, Kessler RC: Prevalence of mental disorders and psychosocial impairments in adolescents and young adults. *Psychol Med* 1998; 28: 109–26.
23. Weir JM, Zakama A, Rao U: Developmental risk I: depression and the developing brain. *Child Adolesc Psychiatr Clin N Am* 2012; 12: 237–60.
24. Beardslee WR, Gladstone TR, O’Connor E: Developmental risk of depression: experience matters. *Child Adolesc Psychiatr Clin N Am* 2012; 12: 261–70.
25. Goldman S: Developmental epidemiology of depressive disorders. *Child Adolesc Psychiatr Clin N Am* 2012; 12: 217–36.
26. Herpertz-Dahlmann B, Wille N, Hölling H, Vloet TD, Ravens-Sieberer U; BELLA study group: Disordered eating behaviour and attitudes, associated psychopathology and health-related quality of life: results of the BELLA study. *Eur Child Adolesc Psychiatry* 2008; 17 Suppl 1: 82–91.
27. Hoek HW: Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. *Curr Opin Psychiatry* 2006; 19: 389–94.

Sexual maturation crises

Sexual maturation crises are common in adolescence, although precise prevalence figures are not available. The affected adolescents are unsure about their sexual orientation, i.e., about whether they are homosexual, heterosexual, or bisexual.

The J1 checkup in Germany

In Germany, pediatricians offer the so-called J1 checkup, which contains screening questions on drug abuse, eating disorders, and social behavior, but adolescents do not make adequate use of it.

28. Herpertz-Dahlmann B, Seitz J, Konrad K: Aetiology of anorexia nervosa: from a „psychosomatic family model“ to a neuropsychiatric disorder? *Eur Arch Psychiatry Clin Neurosci* 2011; 261: 177–81.
29. Jacobi C, Fittig E: Psychosoziale Risikofaktoren. In: Stephan Herpertz, Martina de Zwaan, Stephan Zipfel (eds.), *Handbuch Essstörungen und Adipositas*. Heidelberg: Springer 2008.
30. Wentz E, Gillberg IC, Anckarsäter H, Gillberg C, Rastam M: Adolescent-onset anorexia nervosa: 18-year outcome. *Br J Psychiatry* 2009; 194: 168–74.
31. Odgers CL, Caspi A, Broadbent JM, et al.: Prediction of differential adult health burden by conduct problem subtypes in males. *Arch Gen Psychiatry* 2007; 64: 476–84.
32. Remschmidt, H: *Psychiatrie der Adoleszenz*. Stuttgart: Thieme 1992.
33. Nitkowski D, Petermann F: Selbstverletzendes Verhalten und Suizidversuche: Fundierung der Differentialdiagnostik. *Fortschr Neurol Psychiatr* 2010; 78: 9–17.
34. Plener PL, Brunner R, Resch F, Fegert JM, Libal G: Selbstverletzendes Verhalten im Jugendalter. *Z Kinder-Jugendpsychiatr Psychother* 2010; 38: 77–88.
35. Kolip P, Buksch J, Deutsches HBSC-Team: Gesundheitsriskantes Verhalten im Jugendalter. *Monatsschr Kinderheilk* 2012; 160: 657–61.
36. Frankowski BL: Sexual orientation and adolescents. *Pediatrics* 2004; 113: 1827–32.
37. Pottik KJ, Bilder S, Vander Stoep V, Warner LA, Alvarez MF: US patterns of mental health service utilization for transition-age youth and young adults. *J Behav Health Serv Res* 2008; 35: 373–89.

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Further Information on CME

This article has been certified by the North Rhine Academy for Postgraduate and Continuing Medical Education.

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The present CME unit can be accessed until 22 September 2013.

The CME unit “Premature Birth: Prevention, Diagnosis, and Treatment” (Issue 13/2013) can be accessed until 30 June 2013.

The CME unit “Generalized Anxiety Disorder” (Issue 17/2013) can be accessed until 21 July 2013.

The CME unit “Giant-Cell Arteritis” (Issue 21/2013) can be accessed until 18 August 2013.

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Please answer the following questions to participate in our certified Continuing Medical Education program. Only one answer is possible per question. Please select the answer that is most appropriate.

Question 1

What social changes occur during puberty?

- a) Lesser demands are placed on young people by their parents, peers, and teachers.
- b) Peers take on greater influence in certain areas of life.
- c) Young people tend to join groups that have different values than their parents.
- d) Most young people say they can hardly get along with their parents any more, if at all.
- e) Certain behaviors, such as piercing, arise at the same frequency regardless of social stratum.

Question 2

Which of the following is thought to account for the increased vulnerability of the brain during puberty?

- a) Decrease of white matter
- b) Increase of gray matter
- c) Increased reorganization processes in the brain
- d) Decrease of brain metabolism
- e) Increased excitability of the brain

Question 3

The prevalence of severe mental illnesses rises from childhood to adolescence. Which disorders are most common?

- a) Schizophrenic disorders
- b) Bipolar disorders
- c) Severe developmental disorders
- d) Depressive disorders
- e) Personality disorders

Question 4

The changing prevalence of mental illnesses during puberty is sex-dependent. What is the presumed reason for this?

- a) Sex-specific volume differences in the cerebellum and hypothalamus
- b) Constant hormone levels in girls during puberty
- c) Lower rates of alcohol and drug abuse in boys during puberty
- d) Sex-specific strategies for coping with difficult life events
- e) A protective effect of the earlier onset of puberty in girls

Question 5

What percentage of 14- to 15-year-olds report having feelings of unhappiness?

- a) 10%
- b) 20%
- c) 30%
- d) 40%
- e) 50%

Question 6

Anxiety disorders are common in adolescence. Which of the following is a common consequence of anxiety?

- a) Refusal to go to school
- b) Lessened alcohol consumption
- c) Lessened use of the Internet
- d) Promiscuity
- e) Antisocial behavior

Question 7

Which of the following is a proposed explanation for the rising prevalence of eating disorders in girls as they go through adolescence?

- a) Altered fat distribution with unaltered amount of fat as a percentage of body weight
- b) Delayed development of puberty
- c) Unchallenging social demands
- d) Increased need for autonomy
- e) Increased comparison of self to peers

Question 8

Which of the following is a typical feature of self-injurious behavior?

- a) It is much more common in boys.
- b) Its function is often to regulate affect and tension.
- c) It is seen almost exclusively in borderline disorders.
- d) It is more commonly seen in early puberty.
- e) It is not linked to a higher risk of suicide.

Question 9

Which of the following is true of substance abuse among adolescents?

- a) Substance abuse among adolescents has become much more common recently in Germany.
- b) Adolescents from families of higher social status tend to smoke more.
- c) Substance abuse in adolescents is associated with a higher rate of mental illness.
- d) Substance abuse in adolescents is associated with crises of sexual maturation.
- e) Substance abuse in adolescents is associated only with a higher rate of internalizing disorders.

Question 10

Both specific and nonspecific risk factors are thought to contribute to the development of depression in adolescence. Which of the following is a risk factor?

- a) Family history of cancer
- b) High level of self-confidence
- c) Partnership conflict between parents
- d) Limited hobbies
- e) Low IQ

CONTINUING MEDICAL EDUCATION

Growing Up Is Hard

Mental Disorders in Adolescence

Beate Herpertz-Dahlmann, Katharina Bühren, and Helmut Remschmidt

eREFERENCES

- e1. Hermann Hesse: Rosshalde. Translated by Ralph Manheim. 1986, Paladin; 6–7
- e2. Smetana JG (ed.): Adolescents, families, and social development. How teens construct their worlds. Oxford: Wiley-Blackwell 2011.
- e3. Eissler KR: Notes on problems of technique in the psychoanalytic treatment of adolescents. *Psychoanal Stud Child* 1958; 13: 223–54.
- e4. Rutter M, Tizard R, Yule W, et al.: Isle of Wight studies, 1964–1974. *Psychol Med* 1976; 6: 313–32.
- e5. Kessler RC, Avenevoli S, Costello J, et al.: Severity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication Adolescent Supplement. *Arch Gen Psychiatry* 2012; 69: 381–9.
- e6. Goodman R: The extended version of the strengths and difficulties questionnaire as a guide to child psychiatric caseness and consequent burden. *J Child Psychol Psychiatry* 1999; 38: 581–6.
- e7. Fendrich M, Weissmann MM, Warner V: Screening for depressive disorder in children and adolescents: validating the Center for Epidemiologic Studies Depression Scale for Children. *Am J Epidemiol* 1990; 131: 538–51.
- e8. Birmaher B, Khetarpal S, Brent D, et al.: The screen for child anxiety related emotional disorders (SCARED): scale construction and psychometric characteristics. *J Am Acad Child Adolesc Psychiatry* 1997; 36: 545–53.
- e9. Döpfner M, Steinhausen HC, Coghill D, Dalsgaard S, Poole L, Ralston SJ, Rothenberger A, the ADORE study group: Cross-cultural reliability and validity of ADHD assessed by the ADHD Rating Scale in a pan-European study. *Eur Child Adolesc Psychiatry* 2006; 15:46–55.
- e10. Arbeitsgruppe Deutsche Child Behavior Checklist: Elternfragebogen über das Verhalten von Kindern und Jugendliche; deutsche Bearbeitung der Child Behavior Checklist (CBCL/4–18). Einführung und Anleitung zur Handauswertung. 2. Auflage mit deutschen Normen. Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik 1998.
- e11. Douma SL, Husband C, O'Donnell ME, Barwin BN, Woodend AK: Estrogen-related mood disorders: reproductive life cycle factors. *ANS Adv Nurs Sci* 2005; 28: 364–75.
- e12. Nicholls DE, Lynn R, Viner RM: Childhood eating disorders: British national surveillance study. *Br J Psychiatry* 2011; 198: 295–301.
- e13. Biro FM, Galvez MP, Greenspan LC, et al.: Pubertal assessment method and baseline characteristics in a mixed longitudinal study of girls. *Pediatrics* 2010; 126: 583–90.
- e14. Favaro A, Caregato L, Tenconi E, Bosello R, Santonastaso P: Time trends in age at onset of anorexia nervosa and bulimia nervosa. *J Clin Psychiatry* 2009; 70: 1715–21.
- e15. Graber JA, Lewinsohn PM, Seeley JR, Brooks-Gunn J: Is psychopathology associated with the timing of pubertal development? *J Am Acad Child Adolesc Psychiatry* 1997; 36: 1768–76.
- e16. Patton GC, Hemphill SA, Beyers JM, et al.: Pubertal stage and deliberate self-harm in adolescents. *J Am Acad Child Adolesc Psychiatry* 2007; 46: 508–14.
- e17. Rutter M, Caspi A, Moffitt TE: Using sex differences in psychopathology to study causal mechanisms: unifying issues and research strategies. *J Child Psychol Psychiatry* 2003; 44: 1092–115.
- e18. Hankin BL: Rumination and depression in adolescence investigating symptom specificity in a multiwave prospective study. *J Clin Child Adolesc Psychol* 2008; 37: 701–13.
- e19. Beesdo K, Bittner A, Pine DS, Stein MB, Höfler M, Lieb R, Wittchen HU: Incidence of social anxiety disorder and the consistent risk for secondary depression in the first three decades of life. *Arch Gen Psychiatry* 2007; 64: 903–12.
- e20. Bittner A, Goodwin RD, Wittchen HU, Beesdo K, Höfler M, Lieb R: What characteristics of primary anxiety disorders predict subsequent major depressive disorder? *J Clin Psychiatry* 2004; 65: 618–26.
- e21. Buckner JD, Schmidt NB, Lang AR, Small JW, Schlauch RC, Lewinsohn PM: Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *J Psychiatr Res* 2008; 42: 230–9.
- e22. Hare TA, Tottenham N, Galvan A, Voss HU, Glover GH, Casey BJ: Biological substrates of emotional reactivity and regulation in adolescence during an emotional go-nogo-task. *Biol Psychiatry* 2008; 63: 927–34.
- e23. Herpertz S, Herpertz-Dahlmann B, Fichter M, Tuschen-Caffier B, Zeeck A: S3-Leitlinie Diagnostik und Behandlung der Essstörungen. Berlin, Heidelberg, New York: Springer 2011.
- e24. Klump KL, Keel PK, Sisk C, Burt SA: Preliminary evidence that estradiol moderates genetic influences on disordered eating attitudes and behaviors during puberty. *Psychol Med* 2010; 40: 1745–53.
- e25. Patton GC, Johnson-Sabine E, Wood K, Mann AH, Wakeling A: Abnormal eating attitudes in London schoolgirls—a prospective epidemiological study: outcome at twelve month follow-up. *Psychol Med* 1990; 20: 383–94.
- e26. Mainz V, Schulte-Rüther M, Fink GR, Herpertz-Dahlmann B, Konrad K: Structural brain abnormalities in adolescent anorexia nervosa before and after weight recovery and associated hormonal changes. *Psychosom Med* 2012; 74: 574–82.
- e27. Moffitt TE: Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychol Rev* 1993; 100: 674–701.
- e28. Remschmidt, H: Adoleszenz. Entwicklung und Entwicklungskrisen im Jugendalter. Stuttgart: Thieme 1992.
- e29. Herpertz S: Self-injurious behaviour. Psychopathological and nosological characteristics in subtypes of self-injurers. *Acta Psychiatr Scand* 1995; 91: 57–68.
- e30. Theisen FM, Remschmidt H: Adoleszenz und Schizophrenie. In: Uhlhaas PJ, Konrad K (eds.): Das adoleszente Gehirn. Stuttgart: Kohlhammer 2011; 241–60.
- e31. Holtmann M. Früh beginnende bipolare Störungen. Unterdiagnostiziert oder überbewertet? *Z Kinder-Jugendpsychiatr Psychother* 2009; 37: 159–61.

- e32. Wittchen HU, Behrendt S, Höfler M, et al.: What are high risk periods for incident substance use and transitions to abuse and dependence? Implications for early intervention and prevention. *Int J Meth Psychiatr Res* 2008; 17: 16–29.
- e33. Bühler A, Heppekausen K: Gesundheitsförderung durch Lebenskompetenzprogramme in Deutschland. Grundlagen und kommentierte Übersicht (Gesundheitsförderung Konkret Band 6). Köln: Bundeszentrale für gesundheitliche Aufklärung 2005.
- e34. Thomasius R, Jung M, Schulte-Markwort M: Suchtstörungen. In: Herpertz-Dahlmann B, Resch F, Schulte-Markwort M, Warnke A (eds.): *Entwicklungspsychiatrie. Biopsychologische Grundlagen und die Entwicklung psychischer Störungen*. 2nd, completely revised and extended edition, Stuttgart: Schattauer 2008.
- e35. Klasen H, Woerner W, Rothenberger A, Goodman R: German version of the Strength and Difficulties Questionnaire (SDQ-German) – overview and evaluation of initial validation and normative results. *Prax Kinderpsychol Kinderpsychiatr* 2003; 52: 491–502.