

Anxiety in adolescents: Update on its diagnosis and treatment for primary care providers

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Abstract: Anxiety disorders are the most prevalent mental health concern facing adolescents today, yet they are largely undertreated. This is especially concerning given that there are fairly good data to support an evidence-based approach to the diagnosis and treatment of anxiety, and also that untreated, these problems can continue into adulthood, growing in severity. Thus, knowing how to recognize and respond to anxiety in adolescents is of the utmost importance in primary care settings. To that end, this article provides an up-to-date review of the diagnosis and treatment of anxiety disorders geared towards professionals in primary care settings. Topics covered include subtypes, clinical presentation, the etiology and biology, effective screening instruments, evidence-based treatments (both medication and therapy), and the long-term prognosis for adolescents with anxiety. Importantly, we focus on the most common types of anxiety disorders, often known as phobias, which include generalized anxiety disorder, social anxiety/social phobia, separation anxiety disorder, panic disorder, and specific phobias. In summary, anxiety is a common psychiatric problem for adolescents, but armed with the right tools, primary care providers can make a major impact.

Keywords: anxiety disorders, adolescents, presentation, etiology, assessment, treatment, primary care

Introduction

Anxiety disorders are among the most important health issues facing adolescents, and also their parents and those who work with and treat adolescents. Yet, there is a bit of a paradox surrounding anxiety disorders in adolescents. On the one hand, we know a great deal about anxiety disorders, including the fact that they are the most common psychiatric disorders among adolescents, with an estimated prevalence of 31%.¹ On the other hand, anxiety disorders are the most undertreated mental health problems in adolescents, with recent data indicating that only 18% of anxious adolescents were in treatment.²

How does this make sense? While likely multifactorial, one issue is that there are fewer routine health visits for adolescents than for children, thus providing fewer opportunities for practitioners to pick up on mental health concerns. Also, primary care providers may not have access to the latest research about anxiety disorders in adolescents, given their busy patient loads. Thus, our goal in this paper is to provide a succinct review of what is known about the phenomenology and treatment of anxiety disorders in adolescents.

We will address the following questions: What types of anxiety disorders affect adolescents? How do anxiety disorders present in adolescence? What do we know

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about the etiology and biology underlying anxiety disorders? How can clinicians effectively screen adolescents for anxiety disorders? What evidence-based treatments exist for anxiety disorders in adolescence? What is the long-term prognosis of anxiety disorders in adolescence?

This is no small task, with more than ten distinct types of anxiety disorders currently recognized by the Diagnostic and Statistical Manual, 4th edition, Text Revision (DSM-IV-TR).³ Therefore, we will focus on the most common type of anxiety disorders, often referred to as the “phobias”. Phobias include several disorders, ie, generalized anxiety disorder, social anxiety/social phobia, separation anxiety disorder, panic disorder, and specific phobias. This approach is also consistent with the growing emphasis, including in the upcoming DSM-V, on shared dimensions of psychiatric disorders, rather than the prior focus on distinct categories. We will not focus on either obsessive compulsive-disorder or post-traumatic stress disorder, because research indicates that these two disorders have biological underpinnings distinct from the phobias.⁴

What types of anxiety disorder affect adolescents?

DSM-IV-TR classification

At their most basic level, all anxiety disorders share common features, including excessive fear, avoidance of whatever is feared, and anticipation and worry when expected to encounter whatever is feared (see Table 1, DSM-IV-TR criteria for different forms of phobia-type anxiety disorders). As mentioned, the anxiety disorders that are covered in this review include generalized anxiety disorder (sustained [for months] of uncontrollable worry about many issues), social phobia (fear of social or performance situations), separation anxiety (worry about separation from home or attachment figures), panic disorder (intense bursts of anxiety that have a sudden start and end [eg, lasting longer than 1 hour] accompanied by physical symptoms such as shortness of breath, palpitations, and dizziness), and specific phobia (fear of a certain object or situation, such as spiders or clowns). In the National Comorbidity Survey-Replication-Adolescent Supplement, an epidemiologic sample of 10,123 adolescents in the US, prevalence estimates for the different anxiety disorders were as follows: generalized anxiety disorder 2.2%, social phobia 9.1%, specific phobia 19.3%, panic disorder 2.3%, and separation anxiety 7.6%.¹ Importantly, some DSM-IV-TR anxiety disorders have child-specific modifications for the standard (adult) criteria. For example, child-specific modifications for generalized anxiety disorder include requiring

only one associated symptom instead of three for adults, not requiring children to recognize that fears are excessive and unreasonable, and specifying that children may express anxiety behaviorally as crying, tantrums, freezing, or clinging rather than just verbally stating one’s fear.

Proposed revisions for the DSM-V

As this paper is being prepared, the latest revision of DSM is due for publication in 2013. There are a number of proposed revisions, including some affecting anxiety disorders (see www.dsm5.org). For example, in DSM-IV, panic disorder has two different subtypes, ie, panic disorder with agoraphobia (fear of being in a situation where escape might be difficult, such as away from home, in a crowd, in a bus, plane, or train, in the event of a panic attack) and panic disorder without agoraphobia. In the proposed revisions for the DSM-V, panic disorder and agoraphobia are different disorders, rather than agoraphobia being a specifier within the panic disorder diagnosis. In specific phobia and social phobia, one of the proposed changes eliminates the requirement for the individual to recognize that the fear is excessive or unreasonable. Additionally, the duration requirement of at least 6 months is now required for adults as well as children for specific and social phobia. Proposed changes for generalized anxiety disorder include lowering the required timeframe from at least 6 months to at least 3 months and only requiring one “criterion C” symptom, rather than three, for adults as well as children.

How does anxiety present in adolescence?

Adolescent-specific presentation

Anxiety disorders often present prior to adulthood, thus the need for those working with children and adolescents to be vigilant. For example, data from the National Comorbidity Survey Replication, a nationally representative epidemiologic study, found that most anxiety disorders have a median age-of-onset of 11 years.⁵ Primary care providers, as well as adolescents’ parents, friends, and caregivers, should be aware that anxiety has a unique presentation in children and adolescents. First, anxiety disorders are generally more common in adolescent girls than boys.¹ Additionally, youth may exhibit more behavioral manifestations of anxiety rather than the cognitive or conscious endorsement by the patient, as is more common in adults. For example, children and adolescents often have physical complaints or somatic symptoms of anxiety (ie, stomach or headaches), rather than recognizing anxiety symptoms as such.⁶ Similarly, behavioral

Table 1 Diagnostic and statistical manual of mental disorders, fourth edition criteria by diagnosis

Disorder	Symptom criteria
Generalized anxiety disorder	Nonspecific, uncontrollable worry occurring with three or more of the following symptoms (one for children) Restlessness Fatigue Difficulty concentrating Irritability Muscle tension Sleep difficulties
Social phobia/social anxiety disorder	Fear of humiliation or embarrassment in a social or performance situation that involves possible scrutiny by others. Exposure to the feared object/situation causes immediate anxiety reaction. In children, this may include crying, tantrums, freezing, clinging. In children, there must be evidence that they are able to have age-appropriate relationships, and the anxiety must occur with peers, not just adults.
Separation anxiety	Anxiety concerning separation from home or from attachment figures. Must exhibit three of the following symptoms: Excessive distress when separation occurs or is anticipated Worry about attachment figures getting hurt Refusal to go to school or other places because of fear of separation Reluctance to be alone or without major attachment figures at home or in other settings Refusal to sleep alone or away from home Nightmares about separation Experiencing physical symptoms (such as headaches, stomach aches, nausea, or vomiting) during separation or anticipated separation
Panic disorder	Criteria for a panic attack Sudden onset of four or more of the following symptoms: Racing/pounding heartbeat Sweating Trembling or shaking Shortness of breath Choking feeling Chest pain Nausea/stomach ache Feeling lightheaded Derealization/depersonalization Fear of losing control Fear of dying Numbness or tingling sensations Chills or hot flushes Panic disorder Recurrent unexpected Panic Attacks followed by concern about having additional attacks, worry about the implications of the attack, or a significant change in behavior related to the attacks
Specific phobia	Fear of a specific object or situation (eg, flying, heights, animals, receiving injections, seeing blood). Exposure to the feared object/situation causes immediate anxiety reaction. In children, this may include crying, tantrums, freezing, clinging. The person must recognize that the fear is excessive (can be absent in children).

concerns, such as defiant behavior at home and at school, can also accompany anxiety in youth.⁷ School avoidance, typically due to social phobia or generalized anxiety, is a particularly salient form of such oppositional behavior that often accompanies anxiety, specifically in adolescents.⁶ However, it should be noted that school avoidance is not specific to anxiety disorders, and other causes include learning difficulties or peer conflicts. Studies have demonstrated that school difficulties, decline in school performance,

and even high school noncompletion, are associated with anxiety in children and adolescents by some^{8,9} but not all¹⁰ studies. Social withdrawal from both peers and activities is also common.⁶

Another common feature of the presentation of anxiety disorders is having more than one co-occurring anxiety disorder simultaneously, such as having generalized anxiety disorder and social phobia. This phenomenon, known as “comorbidity”, is common in adolescents and adults suffering

from anxiety disorders. Anxiety and depression are also often comorbid among adolescents.¹¹ Data regarding comorbid substance use/abuse is mixed, with some showing anxious adolescents are at reduced risk,¹² while others have shown increased risk.^{13,14} This may be due to gender differences, with specific types of anxiety disorders, or the interaction. Supporting this possibility, Wu et al¹⁵ found alcohol use to be associated with anxiety in adolescent girls but not boys, and also found that agoraphobia, separation anxiety, and obsessive-compulsive disorder were positively associated with illicit drug use in adolescent girls, while separation anxiety was associated with less drug use in the same sample. Learning disabilities¹⁶ and attention deficit hyperactivity disorder¹⁷ also commonly co-occur with anxiety disorders in youth.

Normative fears and risk factors

An important consideration for primary care providers and parents is how to distinguish fears that are part of typical development from an anxiety disorder. Typically during development, children may be afraid of certain objects or situations. For example, it is common for infants and toddlers to be apprehensive of strangers at 12–18 months of age, known as stranger anxiety, or for school-aged children to be somewhat afraid of germs at 5–7 years, or for adolescents to be somewhat concerned about peer acceptance or rejection.¹⁸ However, these normative fears are typically transient and do not result in functional impairment, in contrast with anxiety disorders which persist and interfere with an adolescent's functioning at home, school, or with peers.

There are several other psychological and environmental risk factors that may differentiate normal fears from anxiety disorders in adolescence. Behavioral inhibition is a temperamental characteristic referring to the trait of some young children to exhibit increased fear in response to new situations. Behavioral inhibition can be assessed via parent-report or retrospective self-report or measured in the laboratory by exposing young children to novel situations and observing their behavior.¹⁹ Behavioral inhibition is associated with anxiety disorders in later childhood and adolescence.^{19–21} Another risk factor for adolescent anxiety disorders is parental anxiety disorders. Specifically, children and adolescents whose parents have an anxiety disorder are more likely to also exhibit anxiety (eg, odds ratio 4.7 for social phobia),²² implicating both genetics and family environment.²³ A third factor that may predispose to anxiety disorders is difficulty with peer relationships, which has

been associated with subsequent anxiety, particularly social anxiety, in adolescents.²⁴

What do we know about the biology underlying anxiety?

We know a tremendous amount about the biology of anxiety disorders. This work draws on a translational approach, including animal models, studies of typically developing humans from childhood to adulthood, and research involving patients with anxiety disorders. Moreover, thanks to the field of affective neuroscience, ie, the field of research devoted to the understanding of brain and behavioral underpinnings of psychiatric disorders, this work has ever increasing clinical implications.

Taken as a whole, these studies have demonstrated a “fear circuit” in the brain, comprised of the amygdala, medial and lateral prefrontal cortex, and hippocampus.²⁵ Structural magnetic resonance imaging studies have examined changes in gray matter volume associated with anxiety disorders in children. Thus far, these studies are limited in number and mixed in results. Specifically, of two studies examining differences in gray matter in child and adolescent patients with anxiety disorders, both have found amygdala abnormalities. However, while one study found increased amygdala volume in children and adolescents with generalized anxiety disorder as compared with healthy control participants,^{4,26} another found decreased amygdala volume in generalized anxiety disorder versus healthy control youth.²⁶

Functional magnetic resonance imaging has also been used to study brain function in anxious youths, as brain activation is measured while participants are completing specific cognitive or emotional tasks. Given the role of the amygdala in both fear circuit and face processing, several studies have examined the role of face processing in child and adolescent anxiety disorders. Studies have found that youth with anxiety disorders have an exaggerated amygdala reaction to viewing fearful faces. For example, Thomas et al²⁷ found that anxious children demonstrated greater amygdala activation in response to fearful faces versus neutral faces as compared with healthy controls and depressed children. Similarly, McClure et al²⁸ found that adolescents with generalized anxiety disorder exhibited a greater difference in amygdala reaction when viewing a fearful versus a happy face as compared with healthy control adolescents. The study also found similar results for prefrontal cortex activation.²⁸ Finally, Beesdo et al¹⁸ found that, when passively viewing fearful faces, youth with anxiety disorders exhibited a greater amygdala response than depressed and healthy control youth. Taken as a whole, face processing studies

indicate an exaggerated amygdala response when viewing fearful faces in anxious youth, implicating the amygdala in the etiology of anxiety in children and adolescents.

Functional magnetic resonance imaging has also been used to study the brain response to threatening situations. Many hypothesize that anxious patients have both increased attention to threatening stimuli, and misperceive neutral stimuli as threatening, both of which are modulated by the amygdala and prefrontal cortex.²⁵ Several studies have used functional magnetic resonance imaging to examine neural function during threat paradigms in anxious youth. Guyer et al²⁹ used a task in which adolescents were anticipating a negative social evaluation, which is a particularly threatening situation for this age group. They found that anxious adolescents demonstrated greater amygdala activation during the task than healthy control adolescents, and also demonstrated greater connectivity between the amygdala and ventrolateral prefrontal cortex when anticipating the negative social evaluations.²⁹ Face processing paradigms can also be used to measure attention to threat using angry faces. Monk et al³⁰ examined adolescents' behavioral and neural responses to angry faces. They found that adolescents with generalized anxiety disorder exhibited a bias away from angry faces, indicating that they avoided the threatening stimulus, as compared with healthy control adolescents. Adolescents with generalized anxiety disorder also showed greater amygdala activation when looking at angry faces as compared with healthy control adolescents.

In summary, structural and functional magnetic resonance imaging studies implicate amygdala alterations in the pathophysiology of anxiety among adolescents. This includes functional magnetic resonance imaging data showing amygdala overactivity when anxious adolescents are engaged in a task that elicits attention to internal feelings of fear,^{18,28} when viewing masked angry faces,²⁹ and when anticipating a negative social evaluation.³¹ Although more mixed, structural magnetic resonance imaging studies also implicate abnormal amygdala volume among anxious youths, as well as alterations in the prefrontal cortex.²⁸⁻³⁰ When evaluating functional magnetic resonance imaging studies, it is important to keep in mind that some findings may be contradictory, and that functional magnetic resonance imaging cannot be used reliably to diagnose anxiety or any other psychiatric disorders.

How can clinicians effectively screen adolescents for anxiety disorders?

Screening teens for anxiety disorders in primary care settings is very important, given the high prevalence of anxiety

disorders among youth,¹ but is very difficult, given that contact between primary care providers and adolescents is all too infrequent and brief. In general, there are many different tools to evaluate adolescents for anxiety disorders and other forms of psychiatric problems, including detailed interviews administered by skilled clinicians (physicians, psychologists, social workers, or nurses), patient self-report measures, and parent/teacher report measures. We have listed a variety of these instruments in Table 2, but primary care providers are most likely to use questionnaires, including patient self-report measures and parent/teacher reports. Primary care providers should use these tools if concerns about potential anxiety arise during an office visit, either through self-reported anxiety symptoms, behavioral concerns that are consistent with anxiety (eg, school refusal, peer difficulties, somatic symptoms), or parent-reported concerns. As recommended by The American Academy of Child and Adolescent Psychiatry in their 2007 practice parameters,³² an anxiety assessment should begin with screening questions, such as self-report and parent-report questionnaires, which should then be followed up with a formal evaluation, such as a structured or semistructured interview, if a high level of symptoms are endorsed on the screening measures. It is also important when assessing for anxiety disorders to consider a differential diagnosis of both physical (eg, hyperthyroidism, migraines) and psychiatric (eg, attention deficit hyperactivity disorder, psychotic disorders, learning disability) conditions that may share symptoms of anxiety disorders.

Self-report measures can be used to screen for anxiety or other psychiatric disorders. They require adolescents to rate statements according to how much they apply to themselves using a Likert scale (eg, never, sometimes, often). The advantage of such self-reports is that they are reliable, with standardized scoring including cutoffs to differentiate between normal and abnormal, but they do not require extensive time, either for personnel training or for administration. Self-report measures can be used in the primary care setting if an anxiety disorder is suspected, by giving an adolescent the questionnaire in the waiting room or during their appointment. Primary care providers can then quickly score the measure to determine whether the adolescent meets the clinical cutoff score, indicating that they are at risk for an anxiety disorder.

There are many self-report screening measures for anxiety disorders in youth (see Table 2). Two of the most common self-report measures to screen for anxiety disorders include the Revised Children's Manifest Anxiety

Table 2 Screening instruments for adolescent anxiety disorders

Instrument	Age range	Description	Reliability/validity
Clinical interviews			
Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions (ADIS-C/P) ⁴³	6–18 years	Semistructured interview. Assesses DSM-IV anxiety diagnoses via interview with child/adolescent and parent. Provides questions for symptoms as well as history of problems, cognitive and situational factors, and avoidance behaviors. Also provides diagnoses for comorbid diagnoses such as ADHD, conduct disorder, and depression. Takes 1–1.5 hours to administer.	Test-retest reliability ranges from κ 0.43 (GAD in adolescents) to κ 0.92 (social phobia in children)
Schedule for Affective Disorders and Schizophrenia for School-Age Children (KSADS) ⁴⁴	6–18 years	Semistructured interview. Assesses DSM-IV major disorders including anxiety, affective, behavioral, eating, psychotic, tics, substance abuse, elimination via child/adolescent and parent interview. Several versions are available including KSADS-P (present state version), KSADS-PL (present and lifetime version) and KSADS-E (epidemiologic version). Takes up to 1.25 hours to administer.	Internal consistency $\alpha = 0.39$ for all anxiety disorders combined, $\alpha > 0.75$ for overanxious disorder and separation anxiety Test-retest reliability $\kappa = 0.78$ for overanxious disorder, $\kappa = 0.80$ for specific phobia
Composite International Diagnostic Interview (CID) ⁹⁵	Children, adolescents, and adults	Standardized interview. Most recent version, 2.1, assesses DSM-IV and ICD-10 disorders. Paper and pencil and computerized versions available. Takes approximately 1.25 hours to administer.	Interrater reliability κ ranged from 0.67–1.0, depending on the study and the disorder. Test-retest reliability ranged from 0.36–1.0, depending on the study, time frame, and disorder. Validity for syndromes κ ranged from 0.02–0.81. Test-retest reliability (κ) for DSM diagnoses ranges from 0.32 (ADHD in children) to 0.92 (conduct disorder in adolescents).
Diagnostic Interview for Children and Adolescents (DICA) ^{96,97}	6–17 years	Semistructured interview. More structured than other semistructured interviews. Developed from the Diagnostic Interview Schedule (DIS), which assesses psychopathology in adults. Assesses DSM-III-R and DSM-IV diagnoses. Paper and pencil and computerized versions available. Takes 1–2 hours to administer.	Test-retest reliability (κ) ranged from 0.55 (conduct disorder) to 1.0 (substance abuse/dependence)
Child and Adolescent Psychiatry Assessment (CAPA) ⁹⁸	9–17 years	Semistructured interview. Assesses DSM-IV, DSM-III-R and ICD-10 diagnoses. Alternate versions expand the age range, including the Young Adult Psychiatry Assessment (YAPA) for ages 18+ and the Preschool-Age Psychiatry Assessment (PAPA) for ages 3–6 years. Takes 1–2 hours to administer.	Test-retest reliability (κ) reported for conduct disorder = 0.78, depression = 0.82, anxiety disorders = 0.72. Concurrent validity with KSADS reported to be acceptable.
Child Assessment Schedule (CAS) ⁹⁹	6–17 years	Semistructured interview. Assesses DSM-IV diagnoses. Questions are organized around 11 topics (school; friends; activities and hobbies; family; fears, worries, and anxieties; self-image; mood; physical complaints; anger; reality-testing).	Interrater reliability was 0.81 for total score, 0.73 for part 1, 0.86 for part 2, 0.87 for part 3. Significant correlations reported with the RCMAS and STAIC-trait scale. Able to distinguish between children diagnosed with anxiety disorders as compared with other psychiatric disorders.
Children's Anxiety Evaluation Form (CAEF) ¹⁰⁰	7–17 years	Semistructured interview, chart review, and direct observation. Consists of three parts. First, available clinical notes are reviewed for the history of the illness. A checklist is provided to aid in the chart review. Second, a semistructured interview is conducted to elicit symptoms of anxiety in addition to their severity and frequency. Third, a checklist is used to evaluate observable symptoms of anxiety on a scale from 0–4. The overall CAEF score, ranging from 0–12, is a summary of global scores obtained from each of the three parts of the evaluation.	

Self-report measures			
Multidimensional Anxiety Scale for Children (MASC) ³³	8–19 years	Assesses anxiety among four subscales: physical symptoms, social anxiety, harm avoidance, and separation/panic. Also includes an anxiety disorders index and total anxiety index. Thirty-nine items rated on a four-point Likert scale from 0–3. A 10-item version is also available. Full measure takes approximately 15 minutes to complete.	Internal consistency varies. Most α s reported >0.80 . However, in females, α ranged from 0.62–0.66 for avoidance and separation anxiety subscales. Test-retest reliability ICC > 0.70 in most reported studies. Good discriminative validity reported. Internal consistency $\alpha = 0.90$ Good discriminate validity reported.
Screen for Childhood Anxiety Related Emotional Disorders (SCARED) ³⁸	9–18 years	Assesses anxiety within five factors: panic/somatic, generalized anxiety, separation anxiety, social phobia, and school phobia. Forty-one items rated on a three-point Likert scale from 0–2. Cutoff score of 25 indicates further evaluation for an anxiety disorder is needed. A five-item version of the scale is available and has similar psychometric properties to the original version. Takes 15 minutes to complete.	Internal consistency $\alpha > 0.80$ in many studies. Test-retest reliability (r) for total scale ranged from 0.30 to 0.88. Reports of discriminate validity are mixed.
Revised Children's Manifest Anxiety Scale (RCMAS) ¹⁰¹	6–19	Evaluates total anxiety as well as three subscales: physiological anxiety, worry, and social concerns/concentration. Also includes a lie scale. Thirty-seven items scored in a yes/no format. Updated version, RCMAS-2, includes social anxiety subscale instead of social concerns/concentration scale and a defensiveness and inconsistent responding index to improve upon the lie scale. A short form of the RCMAS-2 consisting of 10 items is also available. Full version takes approximately 15 minutes to complete. Measures state anxiety (short-term anxiety) and trait anxiety (general proneness towards anxiety) using two subscales. Each subscale consists of 20 items. Takes 10–15 minutes to complete.	Internal consistency $\alpha > 0.80$ in multiple studies. Test-retest reliability for state scale $r = 0.65$ – 0.71 and for trait scale $r = 0.31$ – 0.47 . Reports of discriminate validity are mixed. Internal consistency $\alpha = 0.95$ Test-retest reliability $r = 0.85$
State-Trait Anxiety Inventory for Children (STAIC) ¹⁰²	8–14	Evaluates cognitive, somatic, and behavioral components of social phobia. Twenty-six items, maximum score of 52. Cutoff score of 18 can distinguish between socially anxious and normal control children. Takes approximately 30 minutes to complete.	Internal consistency for SAC-R subscales: SAD-N $\alpha = 0.70$, SAD-G $\alpha = 0.69$, FNE $\alpha = 0.86$. Internal consistency for SAS-A: SAD-N $\alpha = 0.83$, SAD-G $\alpha = 0.76$, FNE $\alpha = 0.76$. Test-retest reliability for SASC-R: SAD-N/FNE $r > 0.70$, SAD-G $r < 0.55$. SAS-A: all r 's > 0.70 . Good discriminate validity reported.
Social Phobia and Anxiety Inventory for Children (SPAI-C) ¹⁰³	8–14	Evaluates social anxiety among three subscales: social avoidance and distress in new situations (SAD-N), social avoidance and distress in group situations (SAD-G), and fear of negative evaluation (FNE). Eighteen descriptive self-statements and four filler items, rated on a scale of 1–5. Takes 10–20 minutes to complete.	Internal consistency for SAC-R subscales: SAD-N $\alpha = 0.70$, SAD-G $\alpha = 0.69$, FNE $\alpha = 0.86$. Internal consistency for SAS-A: SAD-N $\alpha = 0.83$, SAD-G $\alpha = 0.76$, FNE $\alpha = 0.76$. Test-retest reliability for SASC-R: SAD-N/FNE $r > 0.70$, SAD-G $r < 0.55$. SAS-A: all r 's > 0.70 . Good discriminate validity reported.
Social Anxiety Scale for Children-Revised (SASC-R) ¹⁰⁴ and Social Anxiety Scale for Adolescents (SAS-A) ¹⁰⁵	8–18	Evaluates cognitive, somatic, and behavioral components of social phobia. Twenty-six items, maximum score of 52. Cutoff score of 18 can distinguish between socially anxious and normal control children. Takes approximately 30 minutes to complete.	Internal consistency for SAC-R subscales: SAD-N $\alpha = 0.70$, SAD-G $\alpha = 0.69$, FNE $\alpha = 0.86$. Internal consistency for SAS-A: SAD-N $\alpha = 0.83$, SAD-G $\alpha = 0.76$, FNE $\alpha = 0.76$. Test-retest reliability for SASC-R: SAD-N/FNE $r > 0.70$, SAD-G $r < 0.55$. SAS-A: all r 's > 0.70 . Good discriminate validity reported.

(Continued)

Table 2 (Continued)

Instrument	Age range	Description	Reliability/validity
Parent/teacher report measures Child Behavior Checklist (CBCL) and Teacher Report form (TRF) ³⁶	4–18 years	Assesses a range of internalizing and externalizing symptoms yielding subscales in withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior, and also broad internalizing and externalizing problems indexes. One hundred and eighteen items (CBCL) and 120 items (TRF) rated on three-point Likert scale. Takes 15–20 minutes to complete.	Internal consistency for CBCL: $\alpha = 0.90$ for internalizing and 0.94 for externalizing scale. Test-retest reliability for CBCL: $r = 0.91$ for internalizing scale and 0.92 for externalizing scale.
State-Trait Anxiety Inventory for Children-Parent Report-Trait Version (STAIC-P-T) ³⁷	8–14 years	Assesses parents' perception of child's trait anxiety (see STAIC above for more details).	
SCARED ³⁸	9–18 years	Assesses anxiety disorders among the same five factors as the self-report version (see SCARED above for more details).	

Scale (RCMAS) and the Multidimensional Anxiety Scale for Children (MASC).^{33,34} The most recent version of the RCMAS, ie, RCMAS-2, is comprised of three subscales that measure anxiety, including physiological anxiety, worry, and social anxiety. Two additional indices, the defensiveness subscale and inconsistency index, identify random or untruthful responses. Finally, the total anxiety index indicates youth who are at risk for having an anxiety disorder. The RCMAS has been found to be effective in screening for anxiety disorders in primary care settings.³⁵

The MASC was developed specifically for childhood anxiety disorders, rather than being adapted from an adult scale.³³ The MASC has four subscales, including physical symptoms, harm avoidance, social anxiety, and separation/panic. The physical symptoms subscale yields further subdivision into somatic symptoms and tense symptoms, the harm avoidance subscale into perfectionism and anxious coping, and the social anxiety subscale into humiliation fears and performance fears. The scale also has an inconsistency index which allows clinicians to identify random or careless responses, and an anxiety index which identifies youth who are at elevated risk for having an anxiety disorder and warrant further evaluation. While a very useful measure commonly used by mental health providers to screen for anxiety disorders, no known studies have explicitly examined the efficacy of the MASC in primary care settings. Due to their extensive use and research base, we recommend using the RCMAS or the MASC for self-report measures of anxiety.

In parallel with adolescent self-report measures, primary care providers may want to use parent and/or teacher report measures which round out the picture. The most widely used general parent/teacher report measure is the Child Behavior Checklist and Teacher Report Form.³⁶ The Child Behavior Checklist is not specific to anxiety disorders, and in contrast, provides information about several domains, ie, anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems (eg, self-harm, sexual preoccupation, auditory hallucinations), attention problems, rule-breaking behavior, and aggressive behavior (see Table 2).

In contrast, anxiety-specific parent measures include parent versions of the State-Trait Anxiety Inventory for Children³⁷ and the Screen for Childhood Anxiety Related Emotional Disorders (SCARED).³⁸ The social phobia subscale of the parent-report version of the SCARED has been found to be an effective screener for social phobia in a primary care setting.³⁹ The SCARED has also been found to have moderate to high correlation between parent-report and child/adolescent-report in primary care.⁴⁰ In general, when

assessing for anxiety disorders in adolescents, information from multiple informants including youth, parents, and teachers should be gathered whenever possible.⁴¹ Research has found variable agreement between informants when reporting on mental health symptoms in youth.⁴² Adolescents are typically more aware of their own internal distress, such as their subjective feelings of anxiety, while parents and teachers may have a better sense of how anxiety is disrupting their academic and social functioning.³² Teacher-report and parent-report forms can be sent home after an appointment and returned via mail or at the adolescent's next primary care appointment, thus providing more information for the practitioner to use when considering an anxiety diagnosis.

Clinical interviews are the gold standard for diagnostic assessment of anxiety and other psychiatric disorders in children or adults. However, it is unlikely that primary care providers will use these instruments for anxiety or other disorders due to the time and training required to administer them. However, there are several reasons for primary care providers to be aware of these instruments, including the fact that they may see mental health consultants refer to them in their reports.

Clinical interviews can take the form of unstructured, semistructured, and standardized. Unstructured interviews are often used in primary care and mental health settings, and are less reliable because they do not provide a standard set of questions. Semistructured interviews, such as the Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Version (see Table 2) provide initial screening questions about each disorder of interest (eg, anxiety disorders), with interviewers using follow-up questions for greater detail if a patient/parent endorses those initial screening questions. These instruments are "semistructured" (rather than "structured") because they provide structured questions and prompts for evaluating psychiatric symptoms while allowing for some flexibility and clinical judgment, eg, in which prompts are used. Semistructured interviews are more advantageous than unstructured clinical interviews because clinicians can be trained to be reliable, meaning that they will arrive at the same diagnoses as other trained clinicians when interviewing the same patient. However, training is required to achieve reliability, because untrained individuals must rate standardized videotapes of others' interviews or have trained individuals observe untrained individuals' interviews. Moreover, semistructured interviews often require substantial time to administer. Standardized clinical interviews, such as the Composite International Diagnostic Interview (see Table 2), are more structured than semistructured interviews,

because the same set of questions is asked regardless of the interviewee's response. There is little clinical judgment required when administering standardized interviews, and reliability is typically very good. Although less training is required to administer standardized interviews, they are also time-consuming and may not be practical for the primary care setting. Thus, standardized and semistructured interviews may offer the best diagnostic precision in the diagnosis, but are likely inappropriate for the primary care setting due to the time required for training and administration. In terms of structured and semistructured interviews, the Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Version is the most anxiety-focused measure and, therefore, is recommended.^{43,44}

What evidence-based treatments exist for anxiety disorders in adolescence?

Psychological treatment

All too often, psychotherapy is a black box that is not transparent to primary care providers. Thus, we would like to provide a brief description of the major forms of psychotherapy for anxiety disorders including psychoeducation, relaxation techniques, exposures and systematic desensitization, and cognitive behavior therapy. Our goal is to provide an overview of these therapies so as to allow better collaboration with mental health providers, rather than to provide an extensive review or training on all such treatments.

Psychoeducation teaches patients and their parents about anxiety. It can include information about how common or what types of anxiety exist, causes of anxiety disorders (eg, brain changes, genes, environment, and their interaction), physical manifestations of anxiety (eg, racing heart, sweaty palms, headaches, and stomach aches), identification of triggering situations that may lead to anxiety, and the concept that avoiding feared situations can maintain/continue or worsen anxiety.⁴⁵ Primary care providers can administer psychoeducation, as they would for any other illness. Although often paired with other components of therapy (described below), psychoeducation is an important aspect of therapy for anxiety disorders of all types and levels of severity.

Relaxation techniques can also be used in a primary care setting. The technique involves teaching relaxation strategies, such as deep breathing, progressive muscle relaxation, and guided imagery that adolescents can then practice at home. For deep breathing, the adolescent is instructed to take a deep breath in through the nose and out through the

mouth while feeling his or her stomach rise and fall with the breath. Progressive muscle relaxation involves tensing and then relaxing muscle groups one at a time throughout the body (eg, tense and relax toes, ankles, and calves). Guided imagery instructs adolescents to picture a relaxing setting while practicing deep breathing. Therapists teach adolescents to generate the relaxation response, ie, that feeling of relaxation and well-being, during their office-based sessions, that can then be practiced and generalized to other settings where anxiety is more common, such as at school or with peers. Although often paired with other techniques, research has shown that relaxation techniques alone can be effective in significantly reducing anxiety symptoms in adolescents.⁴⁶ Applied relaxation is a technique that has been shown to be effective, particularly for adults with generalized anxiety disorder, in which anxious patients first learn relaxation techniques, such as progressive muscle relaxation, and then learn to apply these techniques during anxiety-provoking situations when they arise in order to control the somatic anxiety response.⁴⁷ Relaxation techniques are particularly effective for those who experience a strong somatic component to their anxiety. However, some experts theorize that relaxation techniques reinforce avoidance behavior and may perpetuate anxiety symptoms in the long term.

Exposure tasks are more complex to conduct and are best utilized in a mental health setting rather than in primary care. During exposure tasks, patients are encouraged to expose themselves to feared situations or stimuli (eg, speaking in public, spiders) in order to reduce avoidance of these situations/stimuli. The goal of exposure is to allow the adolescent to “habituate” to the feared situations/stimuli, meaning they learn that anxiety symptoms will eventually subside on their own without any harmful effects. This leads to extinction, in which the feared situation/stimulus no longer provokes the anxious response. Exposure can be conducted using a fear hierarchy, in which the therapy begins with situations/stimuli that are the least feared and builds up to those that produce the greatest anxiety symptoms.⁴⁸ Exposure tasks are also typically combined with other techniques in therapy, although some research has found that *in vivo* exposures (eg, touching a spider for a spider phobia) may be effective for specific phobias in as few as 1–2 sessions.^{49,50} Systematic desensitization is a related technique, in which patients are exposed to anxiety-provoking situations, either *in vivo* or imaginal (ie, they imagine the anxiety-provoking stimulus) and practice using relaxation techniques during the exposure.⁵¹ Exposure techniques can be very effective for a wide variety of anxiety symptoms and severity levels.

Cognitive behavioral therapy is a form of psychotherapy for anxiety that combines some of the abovementioned techniques with additional treatment components. Cognitive behavior therapy is best used in the context of a longer-term treatment in a mental health setting. At its core, cognitive behavior therapy is based on the idea that one’s thoughts (cognitions), feelings (emotions), and behavior interact, with the goal of cognitive behavior therapy being to identify and to change cognitions and behavior that are maintaining the disorder, thus reducing symptoms and improving a patient’s ability to function.⁵² For example, an adolescent with social phobia might be preoccupied with thoughts about being ridiculed by their peers at an upcoming social event. In terms of behavior, avoiding the feared situation or stimulus, such as not going to the social event in the previous example, often maintains and worsens the anxiety symptoms. In terms of emotions, the feelings of anxiety and possibly poor self-esteem or depression would result from such cognitions and behavior, according to the cognitive behavior therapy model. Cognitive behavior therapy is often disorder-specific, meaning tailored to address particular types of cognitions, emotions, and behaviors associated with one illness, ie, anxiety or depression. The therapy for anxiety disorders typically consists of several techniques, including psychoeducation and exposure tasks, as mentioned above, in addition to cognitive restructuring. Cognitive restructuring teaches patients new, more adaptive ways of thinking, such as realizing that they cannot control others’ behavior or know what others are thinking. For example, for the socially phobic adolescent described above, cognitive restructuring might help the adolescent think of times when they attended a social event and were not ridiculed, or realize that they cannot read the minds of peers to know if they are judging them.

Cognitive behavior therapy has the best evidence-base for treatment of anxiety disorders. This therapy was first used with adults but significant research has now shown that it is also effective for children and adolescents. Individual and group cognitive behavior therapy protocols have both been used effectively to treat anxiety disorders in youth.⁵³ In the first randomized, controlled trial of individual cognitive behavior therapy for anxiety disorders in youth, Kendall⁵⁴ used the “Coping Cat” program to treat 27 youth aged 9–13 years with anxiety disorders compared with 20 youth in a wait-list control condition. The “Coping Cat” program focuses on recognizing and reducing somatic symptoms that accompany anxiety, identifying and coping with maladaptive cognitions present in anxiety-provoking situations, and evaluating performance and providing reinforcement.

A workbook format is used in which a cartoon cat guides children through the different components of the treatment. After treatment, participants who received cognitive behavior therapy were significantly less anxious on many self-report and parent-report measures of anxiety as compared with wait-list control participants.⁵⁴ The “Coping Cat” program can be used with adolescents,⁵⁵ and a manualized adaptation of the program for adolescents, called the CAT project, has also been created.⁵⁶ Some other individualized cognitive behavior therapy protocols have also been shown to be effective in treating youth with anxiety disorders.^{34,57–59} However, many of these studies have examined primarily children and younger adolescents.

Cognitive behavior therapy is not just for individual therapy, because group cognitive behavior therapy has also been effective in treating anxiety disorders in adolescents. Treating anxiety disorders in a group format for adolescents seems logical, given the importance of peers and social interactions in the normal development of adolescents. Moreover, group cognitive behavior therapy provides the opportunity for peer modeling, social interactions, and exposure to potentially feared interpersonal situations.⁶⁰ This is particularly true with social phobia, for which several group treatments have been developed and proven effective in adolescents.^{61,62} Although fewer group treatments are available for other types of anxiety disorders in adolescents, Hudson et al⁶³ found a group treatment with a cognitive behavior therapy component to be more effective than noncognitive behavioral group therapy in treating youth aged 7–16 years with mixed anxiety diagnoses. Studies comparing group with individual cognitive behavior therapy for anxiety disorders in youth have generally found them to be comparable.⁶⁰

Other psychosocial treatment modalities have also been researched for adolescent anxiety disorders. For example, Social Effectiveness Training for Children (SET-C) is a treatment for children and adolescents with social phobia.⁶⁴ The SET-C program comprises psychoeducation, social skills training, and peer generalization, and exposure tasks. Research has found social skills deficits in youth with social phobia, possibly because adolescents with social phobia avoid peer interactions and fail to acquire age-appropriate social skills.⁶⁵ The social skills training in SET-C includes greetings and introductions, starting conversations, maintaining conversations, listening and remembering skills, skills for joining groups, positive assertion, negative assertion, and telephone skills.⁶⁶ This social skills training may be different from social skills training for other disorders, such as autism spectrum disorders, because treatments for autism

spectrum disorders may include the abovementioned skills but also focus on the difficulties with perspective-taking and reading social cues that often accompany autism spectrum disorders, which is not typically seen in adolescents with social phobia.⁶⁶ Peer generalization for this program involves practicing newly acquired social skills with nonanxious peers in an informal setting. SET-C was originally shown to be successful with children aged 8–12 years⁶⁴ and was also used effectively with adolescents.^{62,67} There are some self-help guides for parents or adolescents, that may be helpful tools to recommend to patients for use in conjunction with other forms of treatment.⁶⁸

Supportive therapy is another type of treatment in which the therapist listens to the patient’s concerns and provides empathy and support through techniques such as active and reflective listening. This type of therapy, combined with a psychoeducational component, has been used as a comparison treatment in cognitive behavior therapy studies, and has not been found to be effective to treat anxiety disorders.^{34,69}

Pharmacological treatment

In general, the main category of medications that have been studied for the treatment of anxiety disorders in children and adolescents are the selective serotonin reuptake inhibitors. Randomized, placebo-controlled trials have found fluoxetine,⁷⁰ fluvoxamine,⁷¹ paroxetine,⁷² and sertraline⁵⁹ to be superior to placebo in reducing the severity of anxiety for youth with generalized anxiety disorder, social phobia, and separation anxiety disorder. In perhaps one of the largest randomized, controlled trials in anxious youth, Walkup et al from the Child/Adolescent Anxiety Multimodal Study of 488 children aged 7–17 years found that the combination of sertraline plus cognitive behavioral therapy was more effective than either treatment alone or placebo in reducing severity of anxiety.⁵⁹ Other selective serotonin reuptake inhibitors, including escitalopram⁷³ and citalopram⁷⁴ have also proven effective in open trials for reducing anxiety symptoms in youth.

Although the selective serotonin reuptake inhibitors have become the first-line among medication treatments for anxiety disorders in children, safety considerations are important. This is especially true following the US Food and Drug Administration issuing of a black box warning on these medications that focuses on potential for suicidality in October 2004. This black box warning now extends to all patients aged 25 years or younger (<http://www.fda.gov/Drugs/Drug-Safety/InformationbyDrugClass/UCM096273>).⁷⁵ Current guidelines suggest that adequate parental and patient consent

should be obtained from any patient potentially being prescribed serotonergic antidepressants. This should include a discussion of risks, benefits, and alternatives. Close monitoring is indicated, especially during the first 3 months of initiating these agents or during times of dose changes. Some suggest this monitoring should include weekly contact with the prescriber during the first 8 weeks, although not all of this need be face to face. Primary care providers should also consult either the American Academy of Pediatrics (www.aap.org) or American Academy of Child and Adolescent Psychiatry (www.aaca.org) for the latest information about this evolving topic.

These medications are generally well tolerated, especially when following the typical prescribing advice for children of “start low, go slow”. Common side effects include abdominal pain, nausea, headaches, and drowsiness.⁷⁰ More importantly, since 2003, clinicians and researchers alike have been concerned about suicidality in pediatric populations. Clinicians should educate their patients about this potential risk as well as monitor patients frequently, especially in the first 2–3 months of initiating a selective serotonin reuptake inhibitor.

Primary care providers often wonder which selective serotonin reuptake inhibitor to use first. Following the black box warning, there is more safety evidence for fluoxetine, sertraline, and citalopram. Others suggest that a history of a positive response or side effects in first-degree relatives should guide clinicians, given that the enzymes metabolizing these agents are inherited to some degree. Whichever agent is selected, primary care providers are urged to establish target symptoms by which to measure treatment success or failure in close collaboration with patients and their parents. An adequate trial should be considered of 6–8 weeks at an age-appropriate dose. If no response occurs, then switching to a different selective serotonin reuptake inhibitor for the same duration is often the next step, although care must be taken to wean down the first selective serotonin reuptake inhibitor to avoid excessive serotonin levels and the risk of serotonin syndrome.

In addition to selective serotonin reuptake inhibitors, a serotonin-norepinephrine reuptake inhibitor, venlafaxine, has also been shown to be effective in treating anxiety disorders in youth. In a randomized, placebo-controlled trial in children aged 8–17 years with social phobia, March et al⁷⁶ found venlafaxine extended-release to be associated with significant improvement on the Clinical Global Impression-Improvement (CGI-I) scale. Similarly, Rynn et al⁷⁷ found venlafaxine extended-release to be superior to placebo

in reducing anxiety symptoms in youth with generalized anxiety disorder as compared with placebo in a randomized, controlled trial. Some mild side effects were noted, including asthenia (bodily weakness), pain (eg, headache, abdominal pain), anorexia, and fatigue.⁷⁷

Sometimes primary care providers wonder about using nonserotonergic agents, such as benzodiazepines. Studies have shown that benzodiazepines can be used successfully to treat anxiety in adults.^{78,79} With respect to randomized, controlled trials in pediatrics, Simeon and Ferguson⁸⁰ demonstrated that alprazolam in youth diagnosed with over-anxious and avoidant disorder was no more effective than placebo in reducing severity of anxiety. Moreover, two other concerns about potential side effects may cause clinicians to pause when considering benzodiazepines for anxiety. First and foremost, all patients, ie, children, adolescents, and adults, may potentially become addicted to benzodiazepines, because physiological tolerance (ie, needing greater benzodiazepine doses to achieve the same antianxiety effect) may develop rapidly. Secondly, pediatric patients are especially vulnerable to paradoxical reactions with benzodiazepines, including disinhibition and aggression. Importantly, care should be taken to avoid benzodiazepines with very short half-lives, such as alprazolam or lorazepam, because they are most likely to cause both tolerance and disinhibition. Thus, in general, for anxiety in the pediatric patient, benzodiazepines may be best suited to short-term treatment of phobias, ie, to fly despite fear of flying, or to reduce anxiety associated with eating anxiety in those with eating disorders during initial refeeding.⁸¹

What is the long-term prognosis of anxiety disorders in adolescence?

In general, anxiety disorders may be chronic conditions, with adolescents having anxiety disorders continuing to experience difficulties in multiple domains in later adolescence and adulthood. For example, in an epidemiological study of 776 children and adolescents, Pine et al⁸² found that anxiety disorders in childhood and adolescence were strongly predictive of anxiety in young adulthood. Similarly, Woodward and Fergusson⁸³ studied an epidemiological sample of 964 adolescents in New Zealand, and found strong associations between anxiety disorders in adolescence and future anxiety disorders in later adolescence and young adulthood. In another epidemiological of 1228 adolescents in Germany, Wittchen et al⁸⁴ found that anxiety disorder status was not stable across a 19-month period in adolescence, with approximately 20% of adolescents who met the full criteria

for an anxiety disorder at baseline still meeting the criteria for an anxiety disorder at follow-up. However, 42% of these adolescents were still experiencing anxiety symptoms despite not meeting full criteria for an anxiety disorder.⁸⁴ In a sample of clinically referred children and adolescents, Last et al⁸⁵ found that approximately 50% of their sample had recovered from their initial anxiety disorder after 3–4 years of follow-up, but were significantly more likely than healthy control participants to have developed another form of psychopathology, primarily another anxiety disorder.⁸⁵ The study also examined several variables that may predict recovery including age, gender, history of depression, treatment, family history of an anxiety disorder, and illness severity, but none was a significant predictor. However, youth who received treatment were less likely to develop a new anxiety disorder at follow-up.⁸⁵ Thus, although their initial diagnosis may remit, individuals diagnosed with an anxiety disorder in adolescence typically continue to exhibit significant symptoms of anxiety or develop a new anxiety disorder diagnosis throughout adolescence and into adulthood.

In addition to the continuation of anxiety symptoms, adolescents with anxiety disorders are also at risk for developing other forms of psychopathology longitudinally. Research has repeatedly shown that having an anxiety disorder or experiencing significant symptoms of anxiety in adolescence is a risk factor for adult depression.^{82,83,86–89} Anxiety disorders in adolescence also pose an increased risk for suicidal behavior, but only in the presence of comorbid depression.^{90,91} One study found that female gender was a predictor of developing depression in adulthood, but a second study did not find gender to be a predictor.⁸⁸ Some research has also found that anxiety in youth is associated with increased alcohol and drug use longitudinally.^{83,92,93} Having multiple anxiety disorders in adolescence was found in one study to be associated with a greater risk for developing both depression and substance use disorders in adulthood.⁸³

Conclusion

In summary, anxiety disorders in adolescents are an under-treated major health concern. They present similarly to adult anxiety disorders with some additional features, including somatic symptoms, behavioral concerns, and comorbidity. Affective neuroscience has provided a window into the underlying brain mechanisms that might be involved in anxiety disorders, the most significant of which is at the level of the amygdala. In terms of assessment, structured interviews are the most thorough way to diagnose adolescent anxiety disorders, but self-report and parent-report measures,

such as the MASC, RCMAS, and Child Behavior Checklist are effective screening measures in a primary care setting. Anxiety disorders can be treated using psychotherapy, most notably cognitive behavioral therapy and pharmacological interventions, and a combination of both of these modalities is the most effective form of treatment. Adolescent anxiety typically follows a chronic course with and also leads to other disorders such as depression and substance use in adulthood.

While much is known about adolescent anxiety disorders, there are still many areas for future research. For example, many psychosocial treatments have been developed for children or adults and then used for adolescents in an adapted form. More research is needed in adolescents independently of children and adults in many areas of adolescent anxiety disorders. Nevertheless, research has made significant strides towards our understanding of adolescent anxiety disorders, and many tools and resources are available to assist clinicians in the understanding, identification, and treatment of these disorders.

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