CBT for Adolescents With Anxiety: Mature Yet Still Developing

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Anxiety disorders are common in adolescents (ages 12 to 18) and contribute to a range of impairments. There has been speculation that adolescents with anxiety are at risk for being treatment nonresponders. In this review, the authors examine the efficacy of cognitive-behavioral therapy (CBT) for adolescents with anxiety. Outcomes from mixed child and adolescent samples and from adolescent-only samples indicate that approximately two-thirds of youths respond favorably to CBT. CBT produces moderate to large effects and shows superiority over control/comparison conditions. The literature does not support differential outcomes by age: adolescents do not consistently manifest poorer outcomes relative to children. Although extinction paradigms find prolonged fear extinction in adolescent samples, basic research does not fully align with the processes and goals of real-life exposure. Furthermore, CBT is flexible and allows for tailored application in adolescents, and it may be delivered in alternative formats (i.e., brief, computer/Internet, school-based, and transdiagnostic CBT).

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Adolescence is by no means a unified transition from childhood to adulthood. Rather, adolescence marks a series of interrelated yet not entirely synchronized changes in biological, cognitive, emotional, social, and identity-related functioning (1, 2). Although many of the changes in adolescence contribute positively to an individual's maturation (3), others increase susceptibility to psychopathology, including the anxiety disorders.

Adolescence is a time of vulnerability to anxiety yet, paradoxically, is also a period of increased risk-taking and striving for autonomy (4). Normative adolescent development, both biological and psychological, includes possible sources for increased risk for anxiety disorders. For example, changes in neural white and gray matter density (particularly in the prefrontal cortex) and synaptic pruning coincide with cognitive advances (5), such that the capacity for working memory, metacognition, and hypothetical thought also advance (6). By the same token, these developmental changes have been linked to maladaptive thinking patterns, such as worry in generalized anxiety disorder (7). For instance, the comprehension that thoughts are uncontrollable, inherent in generalized anxiety disorder, emerges between ages 5 and 9 but crystallizes in adolescence (8). Similarly, the capacity to make catastrophic attributions about bodily sensations, common in panic disorder, develops largely in adolescence (9). With increasing cognitive sophistication, adolescents have more existential worries (e.g., the future, death), which complement the challenges of identity development (10). Increased responsibilities, greater independence from parents, and mounting academic pressures are also potential sources of anxiety. Adolescent

social development, including sexual maturation, propensity toward peer relationships, and body awareness from pubertal development, raises self-consciousness and preoccupations with the opinions of others (11, 12). Such developments create vulnerability to social anxiety. Biological and social changes also alter sleep patterns and circadian rhythms during adolescence (13), and these alterations in turn contribute to emotion dysregulation and anxiety in youths (14). Thus, the confluence of normative developmental changes makes adolescence a sensitive period for the genesis and maintenance of anxiety.

Anxiety disorders are among the most common psychiatric disorders in youths (15), with approximately 10%–20% of children and adolescents meeting diagnostic criteria (16). Many of the anxiety disorders of childhood persist into adolescence, and the onset of new anxiety disorders, such as social phobia/social anxiety disorder and panic disorder, commonly emerge in the teen years (17, 18). Anxiety disorders in adolescence predict anxiety as well as substance use disorders into adulthood (19). Adolescents with anxiety disorders also face a range of serious impairments in academic, interpersonal, and leisure functioning (20). Further heightening this concern is that evidence suggests that adolescents with anxiety are a particularly underserved population that often does not receive adequate treatment (21).

Given anxiety's prevalence, chronicity, and impairment, there is a great need for treatments that align with the developmental concerns of adolescence. The first-line psychological treatment for youth anxiety disorders is cognitive-behavioral therapy (CBT) (22). CBT for youths was adapted from adult protocols and addresses symptomatology that

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cuts across anxiety diagnoses (23). Specifically, CBT provides psychoeducation about anxiety, teaches youths skills for managing fears (e.g., relaxation, coping thoughts, problem solving, externalization), and provides a context for youths to gradually encounter their fears and minimize avoidance (e.g., exposure) (24). CBT is present-focused, short-term, and active, requiring youths to participate during in-session and at-home exercises (25). Although CBT principles are evidence based and standardized, clinicians are encouraged to use "flexibility within fidelity," tailoring treatment to the youth's individual presentation (26).

In light of the developmental challenges and increased vulnerability to anxiety during adolescence, some have speculated that adolescents may be less responsive to CBT than adults (27, 28). A recent article in *Biological Psychiatry* (29), a related opinion column in the *New York Times* (30), and other research have highlighted this concern and examined theories on why CBT outcomes may be attenuated. For example, laboratory research in humans and mice suggests that adolescents take longer than adults and children to habituate in fear extinction (31, 32), which in turn suggests that teenagers may be less responsive to exposures in CBT. Second, cognitive and neurological immaturity may hamper adolescents' ability to regulate emotions and process CBT material to engage in treatment (33). Third, strivings for autonomy may hinder therapy engagement as teenagers reject the need for help and collaboration with adults (27). Fourth, adolescents' increasingly busy schedules, marked by extracurricular activities, large academic workloads, and social engagements, may further limit adolescents' willingness to participate in therapy and complete the necessary homework tasks. Fifth, the onset of depression and social anxiety disorder emerge in adolescence, and both conditions have been suggested to be linked with less favorable treatment response in CBT for anxiety (34). Sixth, years of avoidant coping and distorted thoughts may be established and recalcitrant by the time an individual reaches adolescence (35). Aside from issues linked to adolescence, other pitfalls may exist in the treatment itself. For example, some have criticized manual-based CBT for a "cookie-cutter" approach with limited adaptability to the developmental needs of teenagers. What does the research literature have to say on these issues?

In this review, we examine the status of the research findings evaluating CBT for adolescents with anxiety. Our central objectives were to report rates of improvement for adolescents and to examine whether or not adolescents have poor outcomes relative to preadolescent children. In other words, is the concern that adolescents are more likely to have an unfavorable treatment response warranted? First, we review studies that evaluated CBT in mixed child and adolescent samples. Second, we provide an overview of the smaller number of outcome trials with adolescent-only samples. Third, we examine adaptations of CBT for adolescents that have been evaluated, including brief CBT, computer-based CBT, transdiagnostic treatment, and CBT in community-based settings. We then discuss the reported findings, and we conclude with suggestions for future research. Note that we focus on the large randomized clinical trials evaluating CBT for youths with anxiety; in areas where less research has been conducted, pilot studies are cited. Note also that operationalizing "adolescence" proved a challenge, given the heterogeneity of biological, cognitive, emotional, and social maturity in youths. Despite its imprecision, we used age as a proxy or marker of adolescence, given that most randomized clinical trials lack measures of adolescent maturation (e.g., pubertal status, cognitive ability). We define adolescence as ages 12 to 18, in line with randomized clinical trials for CBT of youth anxiety (34). This review extends beyond past reviews by including a broader range of studies (e.g., both mixed-aged and adolescent-only studies), focusing on the anxiety disorders defined by DSM-5, examining outcomes associated with CBT and not other treatments (e.g., eye movement desensitization and reprocessing), including up-to-date research from the Child-Adolescent Anxiety Multimodal Study (CAMS), outlining alternative modalities of CBT for adolescents, and responding to criticism of poor CBT response for adolescents from an empirical and theoretical perspective.

EFFICACY OF CBT FOR ANXIETY IN ADOLESCENCE

Assessing CBT in Mixed Child and Adolescent Samples

There have been over two dozen randomized clinical trials examining CBT in mixed child and adolescent samples. Outcomes across ages indicate large pre- to posttreatment effect sizes and medium to large effect sizes for CBT compared with control conditions (36), with minimal differences between individual and group CBT formats (37) and between individual and family CBT (38). The studies find that approximately 60% to 80% of youths show clinically significant improvement (response), and that in more conservative measures of outcome, such as remission (defined as the absence of the principal anxiety disorder following treatment), evidence rates are in the range of 50%–70% (39). Additionally, evidence from follow-up studies ranging from 1 to 19 years indicates that gains are maintained after treatment (40–42). Thus, according to the criteria established by the Division of Clinical Psychology of the American Psychological Association, CBT is the only "well-established" intervention for anxious youths (43).

Although the outcomes are favorable, the age range of samples (e.g., ages 7–17) could mask differential outcomes by age. That said, in nearly all studies that examined age as a potential predictor of outcomes, few significant differences in outcome were found between children and adolescents (Table 1) (44–67). The results are consistent, although some caution is warranted, as some studies may have been underpowered to detect a difference or been limited by methodological weaknesses. Additionally, most of the studies only included youths in early adolescence, although some of the largest trials included the full range of ages. Comparisons of differential outcomes by age can also be confounded by the fact that diagnoses vary across ages; prevalences are greater for separation anxiety disorder in children and for social phobia in adolescents (68). Finally, a number of studies did

TABLE 1. Studies Examining CBT for Anxiety Disorders in Combined Child and Adolescent Samples

Study	N	Age Range (years)	Diagnosis	Treatment Groups	Remission Rates[a]	Age Effect
Barrett (44)	60	7–14	Mixed	Group CBT; group CBT plus family management; waiting list	Group CBT, 65%	Not reported
Barrett et al. (45)	79	7–14	Mixed	CBT; CBT plus family management; waiting list	CBT 70%; 60%[b]	No differences
Beidel et al. (46)	67	8–12	Social phobia	Group CBT; Testbusters (nonspecific intervention)	CBT, 67%	No differences
Cobham et al. (47)	67	7–14	Mixed	CBT; CBT plus parent anxiety management	CBT, 39%–82%	No differences[c]
Dadds et al. (48)	128	7–14	Mixed	Group CBT; self-monitoring	CBT > self-monitoring[d]	No differences
Flannery-Schroeder and Kendall (49)	45	8–14	Mixed	CBT; group CBT	Group CBT, 50% CBT, 75%	Not reported
Hudson et al. (50)	112	7–16	Mixed	Group CBT; education/ support	CBT, 68%	Not reported
Kendall (51)	47	9–13	Mixed	CBT; waiting list	CBT, 64%	Not reported
Kendall et al. (52)	94	9–13	Mixed	CBT; waiting list	CBT, 53%	No differences
Kendall et al. (53)	107	7–14	Mixed	CBT; family CBT; education/ support	CBT and family CBT, 64%	No differences
King et al. (54)	34	5–15	Mixed (school refusal)	CBT; waiting list	CBT, 88%	No differences
Last et al. (55)	56	6–17	Mixed (school refusal)	CBT; attention placebo	CBT, 65%	Not reported
Lyneham and Rapee (56)	100	6–12	Mixed	Bibliotherapy CBT plus either telephone contact, e-mail contact, or waiting list	Bibliotherapy CBT plus telephone contact, 79%	Not reported
Manassis et al. (57)	78	8–12	Mixed	CBT; group CBT	CBT = group CBT[e]	No differences
Mendlowitz et al. (58)	62	7–12	Mixed	Group CBT; group CBT plus family treatment; family treatment only; waiting list	CBT > waiting list[f]	Not reported
Muris et al. (59)	30	9–12	Mixed	Group CBT; placebo; waiting list	CBT > placebo and waiting list[f]	Not reported
Nauta et al. (60)	79	7–18	Mixed	CBT; CBT plus parent training; waiting list	CBT, 54%	No differences
Pina et al. (61)	88	M=10.4	Mixed	CBT; CBT plus parent training	N/A[g]	Not reported
Rapee et al. (62)	267	6–12	Mixed	Group CBT; waiting list; placebo	CBT, 61%	Not reported
Schneider et al. (63)	64	8–13	Separation anxiety disorder	CBT (general); CBT (specific for separation anxiety)	CBT, 82% CBT for separation anxiety, 88%	Not reported
Silverman et al. (64)	41	60–16	Mixed	Group CBT; waiting list	Group CBT, 64%	No differences
Silverman et al. (65)	81	6–16	Specific phobia	CBT; behavioral therapy; education/support	CBT, 88%; behavioral therapy, 55%	No differences
Spence et al. (66)	50	7–14	Social phobia	CBT; family CBT; waiting list	CBT, 58%; family CBT, 87%	Not reported
Walkup et al. (67)	488	7–17	Mixed	CBT; CBT plus medication; medication; placebo	CBT plus medication, 65%; CBT, 36%	Mixed[h]

[a] Remission rates at posttreatment assessment.
[b] Sixty percent of adolescents (ages 11–14) met remission criteria.
[c] Adolescents had a higher remission in CBT (86%) than in CBT plus parent anxiety management (20%).
[d] Remission rates not included, partial prevention study.
[e] Significant improvements were seen in both CBT and group CBT; remission rates not reported.
[f] Active treatments were superior to waiting list; remission rates not reported.
[g] Partial prevention study; 87% in the CBT plus parent training group and 96% in the CBT group were diagnosis free at posttreatment assessment.
[h] Adolescents had poorer remission rates than children (34), but there were no differences in treatment response rates (75).

not test for differential response rates by age. One study examining outcomes for youths with mixed-anxiety diagnoses in an outpatient clinic did find a poorer response among adolescents compared with children (69), although the study was published before the introduction of the Coping Cat program (70), which was designed specifically for adolescents with mixed-anxiety presentations.

Addressing the need for an integration of the data on age as a moderator of outcomes, Bennett et al. (27) investigated the role of age across randomized clinical trials for CBT in mixed-aged anxious youths (ages 6–19) through an individual patient data meta-analysis. To be eligible, studies had to examine CBT compared with a waiting list or attentional control, use a common CBT protocol for all study participants, be conducted in English, use outcome assessments, and use face-to-face CBT, with participants 6–19 years of age who had an anxiety diagnosis at baseline. The authors identified 23 eligible trials and obtained data for analysis from 16 studies (N=1,171

cases). The results of the meta-analysis indicated no significant moderation by age on outcome using the Anxiety Disorder Interview Schedule (71), which is consistent with results of a previous meta-analysis by Silverman et al. (37). It is worth noting that the Bennett et al. results were consistent when measuring age as a dimensional or a categorical variable. The results are bolstered by the proportionally high number of studies analyzed, the studies' use of the gold-standard Anxiety Disorder Interview Schedule, their use of covariates in the models (e.g., baseline anxiety severity and depression), and the authors' use of the individual patient data meta-analysis approach, which yielded greater power to analyze individual randomized clinical trials and random-effects models that provide a conservative approach to analysis.

In another meta-analysis, Reynolds et al. (72) evaluated 55 studies in which participants were under age 19, had elevated anxiety or a formal DSM-IV anxiety diagnosis at a pretreatment assessment and received anxiety-focused treatment (with outcomes reported), and were randomly assigned to a treatment or a control condition. Twenty of the studies included children only (under age 13), and six examined adolescents only. The authors found that age did predict outcome, with larger treatment effect sizes for adolescents than for children (large effects, compared with small to medium). Effects were also calculated by groupings of mean age. Studies whose participants had a mean age of 7–8 years had medium to large effects (N=3), those with a mean age of 9–10 years had small effects (N=19), those with a mean age of 11–12 years had medium to large effects (N=7), those with a mean age of 13–14 years had large effects (N=4), and those with a mean age of 15 years or older also had large effects (N=5). However, the results should be interpreted with caution, as Reynolds et al. analyzed a wider range of randomized clinical trials than did Bennett et al. (27), including samples with principal diagnoses of obsessive-compulsive disorder and posttraumatic stress disorder as well as studies evaluating non-CBT therapies (e.g., eye movement desensitization and reprocessing). The review also did not reanalyze data using an individual patient data meta-analysis approach, as Bennett et al. did. Taken together, the meta-analytic findings do not indicate inferior outcomes for adolescents.

The review by Bennett et al. (27) did not include data from the Child-Adolescent Anxiety Multimodal Study (CAMS) (67) in its analysis because that study used a separate (although similar) treatment manual for adolescents. CAMS is the largest randomized clinical trial for anxiety treatment to date (488 youths, ages 7–17). Youths with a principal diagnosis of generalized anxiety disorder, social phobia/social anxiety disorder, or separation anxiety disorder were randomly assigned to one of four conditions: 12 weeks of CBT, medication (sertraline), combination treatment, or pill placebo. The results indicated that the combination treatment was associated with greater gains compared with CBT alone and medication alone. Monotherapies were statistically equivalent, and all active treatments were superior to placebo (Table 2) (34, 67). With regard to patient age in the CAMS study,

Ginsburg et al. (34) found that age was associated with two of three measures of remission (the Anxiety Disorder Interview Schedule and the severity scale of the Clinical Global Impressions Scale [CGI], but not on remission as defined by the CGI improvement scale ["very much improved"] [73]), such that adolescents were less likely than children to achieve remission. Age differences were not tested by treatment condition, limiting the conclusions that can be drawn about differences by age specific to CBT. For example, although adolescents fared worse on the CGI severity scale overall, the proportions receiving CBT only who remitted differed by only 3% between the two age groups. Further discrepancies in favor of children were noted across non-CBT conditions, including better outcomes for children in the placebo group. Remission rates by age group are presented in Table 3.

When treatment response (significant reduction in anxious symptoms) was evaluated, age did not moderate outcome for any of the treatment conditions when examined categorically and dimensionally (e.g., on the CGI improvement scale or on the Pediatric Anxiety Rating Scale) (74, 75). Results at 24 and 36 weeks showed that treatment response and remission for the combined treatment remained consistent, yet the monotherapies' outcomes improved considerably on some measures (see Table 2) (76). Unfortunately, age has yet not been examined in follow-up. At 6 years after randomization, remission, cautiously defined as the absence of all study entry anxiety disorders, was 49% for combined treatment, 52% for medication, and 46% for CBT (77). Age did not predict remission.

Overall, findings from the CAMS trial present a somewhat mixed picture on adolescent-specific outcomes, with minimal age differences. Longer follow-ups of CAMS participants are under way, and future research will also examine age. In the article by Drysdale et al. (29), the authors proposed larger effects for CBT compared with placebo for children over adolescents. All told, however, we emphasize that the acute outcomes from the CAMS study, the null findings of Bennett et al. (27), and other research do not provide sufficient data to conclude that age predicts differential outcome in studies using mixed child and adolescent samples.

Perhaps adolescents, relative to children, do not differ in response to treatment but in the course of treatment. One investigation that measured symptom trajectory using multilevel growth models found that adolescents showed less symptom improvement in the early stages of treatment relative to children, despite no significant difference in symptom measures between the groups at termination (78). Differential time course may be attributed to less initial engagement by adolescents or less responsiveness to non-exposure components presented in the first half of treatment (e.g., relaxation, cognitive restructuring, problem solving). Such findings suggest that adolescents are capable of responding to treatment but that treatment modifications are necessary to maximize outcomes.

TABLE 2. Response and Remission Rates (%) at Posttreatment and 36-Week Follow-Up Assessments in the Child-Adolescent Anxiety Multimodal Study[a]

Condition and Assessment	Response	Remission	
	CGI Improvement Score[b]	Anxiety Disorder Interview Schedule[c]	CGI Severity Score[d]
Combination			
Posttreatment	81	68	65
36 weeks	83	73	67
CBT			
Posttreatment	60	46	36
36 weeks	72	52	58
Medication			
Posttreatment	55	46	46
36 weeks	71	52	63
Placebo			
Posttreatment	24	24	27

[a] Data are from references 34 and 67. CGI=Clinical Global Impressions Scale; CBT=cognitive-behavioral therapy (Coping Cat program); medication=sertraline; combination=CBT plus medication; placebo=pill placebo.
[b] Scored as "very much improved" or "much improved."
[c] Loss of all targeted anxiety diagnoses (e.g., generalized anxiety disorder, social phobia, separation anxiety disorder).
[d] Scored as "not at all ill" or "borderline mentally ill."

TABLE 3. Remission Rates (%) at Posttreatment Assessment, by Age Group, in the Child-Adolescent Anxiety Multimodal Study[a]

Condition and Group	Anxiety Disorder Interview Schedule	CGI Severity Score	CGI Improvement Score
Combination			
Children	73	70	48
Adolescents	59	54	41
Medication			
Children	51	51	37
Adolescents	35	37	23
CBT			
Children	52	37	20
Adolescents	36	34	21
Placebo			
Children	26	30	16
Adolescents	19	21	14

[a] Data are from reference 34. CGI=Clinical Global Impressions Scale; CBT=cognitive-behavioral therapy (Coping Cat program); medication=sertraline; combination=CBT plus medication; placebo=pill placebo.

Assessing CBT in Adolescent Samples

Although the bulk of research that has examined the efficacy of CBT has used combined child and adolescent samples, there are studies that have assessed efficacy exclusively in teenagers. To address unique treatment concerns for adolescent samples, studies either used existing child treatments and modified them to be developmentally sensitive or used treatments that were specifically developed for adolescents (e.g., the Coping Cat program for generalized anxiety disorder, social phobia/social anxiety disorder, specific phobia [70]; cognitive behavioral group therapy for adolescents for social phobia/social anxiety disorder [79]; panic control treatment for adolescents for panic disorder [80]).

Outcomes from randomized clinical trials evaluating adolescent-only samples are fairly comparable to those from trials using mixed-age samples (Table 4) (81–89). Studies of adolescents report significant improvement from pre- to posttreatment assessments, medium to large effect sizes, and superiority over control conditions. Significant improvement in symptoms has been measured on a variety of assessments, including diagnostic interview, self-report, and behavioral assessment (85, 86). Reduction of symptoms has also been observed for comorbid diagnoses (87). Although some remission rates in adolescent-only samples at posttreatment assessment appear lower than those in studies with mixed child and adolescent samples (Table 1), there is evidence that adolescents show continued improvement at follow-up, with a group CBT study reporting a 27% remission rate at posttreatment assessment and 54% at 6-month follow-up (85), another reporting a 45% remission rate at posttreatment assessment and 60% at 1-year follow-up (84), and a third

study reporting that two of three CBT treatments had an average remission rate of 35% at posttreatment assessment and 52% at 1-year follow-up (82). Most studies of adolescents are restricted to youths with social phobia/social anxiety disorder, although other studies have reported significant improvement in panic disorder (89) and in mixed-anxiety samples (83). Favorable outcomes and attrition rates comparable to those for children (90) indicate that CBT is an effective treatment in adolescent samples.

ADAPTATIONS OF CBT

Although CBT produces favorable outcomes in randomized clinical trials, there remains room for improvement. Variations in the provision of CBT may better individualize treatment for adolescents with unique needs and improve outcomes for patients who might otherwise be treatment nonresponders. Although research in this area is less developed relative to efficacy trials, studies examining brief CBT, computer/Internet-delivered CBT, transdiagnostic treatments, and community/school-based delivery indicate positive outcomes when treating youths with heterogeneous presentations (Table 5) (91–98). Alternative forms of delivery and treatment modifications suggest CBT's versatility and generalizability with adolescent samples.

Brief Cognitive-Behavioral Therapy

Brief CBT is an alternative form of delivery that condenses core components of CBT and removes elements with less empirical support (e.g., relaxation) (99). As such, brief CBT maintains the integrity of evidence-based protocols but delivers the intervention in fewer sessions and/or less time. To date, brief CBT has been examined in one trial for anxious adolescents (100). Twenty-six adolescents with panic disorder were assigned to receive weekly panic control treatment (11 sessions over 12 weeks) (see reference 80) or an 8-day brief

TABLE 4. Studies Examining CBT for Anxiety Disorders in Adolescent-Only Samples

Study	N	Age Range (years)	Diagnosis	Treatment Groups	Remission Rates[a]
Baer and Garland (81)	12	13–18	Social phobia	Group CBT; waiting list	CBT, 36%
Garcia-Lopez et al. (82)	59	15–17	Social phobia	Group CBT; control	Group CBT, 40%[b]
Ginsburg and Drake (83)	12	14–17	Mixed	Group CBT; education/support	CBT, 75%
Hayward et al. (84)	70	14–17	Social phobia	Group CBT; waiting list	CBT, 45%
Herbert et al. (85)	73	12–17	Social phobia	CBT; group CBT; education/support	CBT, 29%; group CBT, 27%
Ingul et al. (86)	57	13–16	Social phobia	CBT; group CBT; attention placebo	CBT, 73%; group CBT, 53%
Masia-Werner et al. (87)	35	13–17	Social phobia	Group CBT; waiting list	CBT, 67%
Masia-Werner et al. (88)	36	14–16	Social phobia	Group CBT; attention placebo	CBT, 59%
Pincus et al. (89)	24	14–17	Panic disorder	CBT; self-monitoring	CBT > self-monitoring[c]

[a] Remission rates at posttreatment assessment.
[b] Average across three treatment conditions.
[c] Large effect sizes reported for CBT, superior to control; remission rates not reported.

CBT (see reference 101). Brief CBT yielded medium to large effect sizes at the posttreatment and 6-month follow-up assessments, with significant reductions in anxiety comparable to those of standard-duration weekly treatment. Brief CBT has also been tested in pilot studies with combined child and adolescent samples, including an eight-session adaptation of Coping Cat for youths with mixed anxiety (ages 6–13) (102) and a 1-week therapy summer camp for youths with social anxiety disorder (ages 7–12) (103); both brief CBT programs showed significant reductions in anxiety (the remission rates were 42% at posttreatment assessment and 65% 1-year follow-up [102], and 50% at posttreatment assessment [103]).

In its briefest form, CBT for specific phobias in youths has been reduced to a one-session treatment that lasts several hours (104, 105). One-session treatment has been assessed in mixed child-adolescent samples in seven studies, including several randomized clinical trials (106–108), and is considered an effective treatment for specific phobias (108). In the largest study to date (ages 7–16), Ollendick et al. (108) found that 55% of youths who received the one-session treatment were diagnosis free at the posttreatment assessment (49% at the 6-month follow-up), compared with only 2% at posttreatment and follow-up assessments for youths in a waiting list condition, and 23% at posttreatment assessment and 21% at the 6-month follow-up for youths who received education/support treatment. Although all seven one-session treatment studies used mixed child-adolescent samples, age was not found to be associated with treatment outcome (108). Overall, brief CBT has shown acceptability, feasibility, and efficacy in youth samples, particularly for specific phobia. However, additional studies are needed to test brief CBT in adolescent-only samples as well as in youths representing a wider variety of anxiety diagnoses.

Computer- and Internet-Delivered CBT

Computer- or Internet-delivered CBT has the potential to advance dissemination to adolescents (109) and to facilitate engagement by using a platform with which young people are already familiar and comfortable. These programs are typically completed online or through downloadable content (with a therapist at a clinic) or at home with modest remote therapist consultation. Although the emphasis of several computer/Internet CBT protocols has been placed on younger age groups (e.g., Camp Cope-A-Lot [110]; the BRAVE Program [92]), programs for adolescents are available (112, 113). Studies examining computer/Internet CBT in mixed-aged youths have reported patient acceptability and outcomes superior to control conditions and comparable to outpatient CBT (92, 113, 114). Addressing adolescents in particular, a randomized clinical trial with 115 youths 12–18 years old compared Internet-delivered CBT (the youth goes through Web-based modules and a remote therapist follows up with weekly e-mails and an occasional telephone call), computer-based CBT (the youth goes through online modules at the clinic with a therapist), and a waiting list condition (116). Both active treatment conditions showed significantly greater reductions in anxiety compared with the waiting list condition at the posttreatment assessment (remission rates of 37% for the Internet-delivered CBT group, 33% for the computer-based CBT group, and 4% for the waiting-list group), with added gains at the 12-month follow-up assessment (remission rates of 78% for the Internet-delivered CBT group and 81% for the computer-based CBT group). These results are comparable to the outcomes reported in CAMS (67), suggesting that computer- or Internet-delivered CBT is a viable alternative for adolescents. Additional research for replication, examination of predictors of differential outcomes, and further development of telehealth ethical guidelines (e.g., confidentiality, safety) is needed.

Transdiagnostic Treatments

High comorbidity rates of anxiety with other psychiatric disorders (117) (especially depression [118]), a return to functional analytic thinking, and a gradual paradigm shift toward targeting underlying deficits rather than categorical disorders (119) have served to promote broad-based transdiagnostic treatments (120). Most treatments for adolescent anxiety are designed to address one or several similar anxiety disorders, whereas a transdiagnostic approach targets anxiety and non-anxiety comorbidities and the shared mechanisms of dysregulation. For example, the Modular Approach to Therapy for Children With Anxiety, Depression, or Conduct Problems (MATCH) (121) invites therapists to select specific modules to target areas of deficits with the assistance of flowcharts (e.g., problem

TABLE 5. Studies Examining CBT for Anxiety Disorders Using Adapted Protocols

Study	N	Age Range (years)	Diagnosis	Study Type	Treatment Groups	Remission Rates[a]	Age Effect
Bodden et al. (91)	128	8–17	Mixed	Partial effectiveness	CBT; family CBT	CBT, 53%; family CBT, 28%	Children > adolescents
March et al. (92)	73	7–12	Mixed	Internet CBT	Internet CBT; waiting list	CBT, 58%	Not reported
Ollendick et al. (93)	196	7–16	Specific phobia	Brief CBT, one session	Brief CBT; waiting list; education/support	CBT, 55%	No differences
Öst et al. (94)	60	7–17	Specific phobia	Brief CBT, one session	Brief CBT; brief CBT plus parent training; waiting list	CBT, 91%; CBT plus parent training, 65%	No differences
Southam-Gerow et al. (95)	48	8–15	Mixed	Effectiveness	CBT; usual care	CBT, 73%	No differences
Spence et al. (96)	72	7–14	Mixed	Internet CBT	CBT; Internet CBT; waiting list	CBT, 67%; Internet CBT, 61%	No differences
Thirlwall et al. (97)	194	7–12	Mixed	Parent-guided CBT	CBT; waiting list	CBT, 50%	Not reported
Wergeland et al. (98)	182	8–15	Mixed	Effectiveness	CBT; group CBT; waiting list	CBT, 26%; group CBT 21%	No differences

[a] Remission rates at posttreatment assessment.

solving, behavioral avoidance, parental reinforcement of misbehavior). In a randomized clinical trial in 174 youths 7–13 years old (29% with a principal anxiety disorder, 57% with any anxiety disorder), MATCH outperformed usual care and was comparable to standard manual-based CBT on clinical remission, yielding an average of one less diagnosis at posttreatment assessment (122). Unfortunately, the study was not powered to test for age differences. Modular treatment has been tested in anxious samples in pilot studies (123), but not all studies found it to outperform usual care (124). More studies are needed that test MATCH's efficacy as well as to develop modular treatment for youths in mid to late adolescence.

Another approach to transdiagnostic treatment is the Unified Protocol for the Treatment of Emotional Disorders in Adolescents (UP-A) (125). UP-A treats emotional disorders broadly, targeting shared underlying problems (e.g., emotional avoidance, cognitive distortions). UP-A, an adaptation of an adult unified protocol, was designed to treat adolescent-specific depression and anxiety in eight to 21 sessions (126). Although research on UP-A has thus far been limited to case studies (127), results from an adult randomized clinical trial show UP to be superior to a waiting list condition in treating emotional problems (128). Despite its strength in targeting overlapping disorders specifically in adolescence, the absence of randomized clinical trials limits conclusions we can draw about it, and research is needed to assess UP-A outcomes relative to empirically supported treatments for adolescent anxiety and depression.

Effectiveness Research

Recent studies have assessed the effectiveness of CBT for youths, including adolescents, in naturalistic settings, such as community clinics and schools. In community clinic randomized clinical trials, CBT for child and adolescent anxiety evidences significant improvements in symptoms at posttreatment assessment, yet effect sizes have been lower than in efficacy trials and are sometimes comparable to those of treatment as usual (95, 98, 129). However, a recent trial in community clinic settings in Norway (N=159; ages 7 to 13) demonstrated a 51% remission rate at posttreatment assessment and a 96% remission rate at 2-year follow-up (130). Studies of adolescent-only samples are lacking; however, preliminary research suggests CBT's effectiveness compared with a waiting list condition for adolescents with social phobia (81). Potential explanations for CBT's relatively less impressive performance in effectiveness compared with efficacy trials include a lack of CBT experience and underutilization of exposures among community clinicians (95), increased comorbidity in community samples, and methodological issues (e.g., studies being underpowered and CBT content being included in the control/comparison conditions).

CBT's effectiveness for teens has been further bolstered by studies examining its generalizability to culturally and ethnically diverse samples. Preliminary studies report effectiveness of CBT for anxious youths in minority samples, including African Americans (83) Latino Americans (61, 131), Asian Americans (123), as well as in samples in other countries (82, 91, 132). A recent open clinical trial of mixed-age youths (ages 10 to 17) found moderate to large effects for CBT among anxious Brazilian youths, supporting the effectiveness and transportability of CBT in low- and middle-income countries (134). Initial findings are promising and show comparable outcome rates across diverse samples. Researchers must continue to develop guidelines for culturally sensitive adaptations that maintain the integrity of CBT (135).

School-based programs have also found gains from CBT across age. A meta-analysis by Mychailyszyn et al. (136) synthesized 12 universal intervention studies that found moderate effects for anxiety reduction and reported no significant

differences by age. School-based studies with exclusively adolescent samples are rare, but one such randomized clinical trial (87) found that CBT was superior to a waiting list condition for adolescents with social anxiety disorder (67% of the CBT group were diagnosis free at end of study, compared with 6% of the waiting list group), which is consistent with findings from smaller studies examining anxious adolescents in school settings (135, 137).

CONCLUSIONS

The overall outlook for CBT for adolescents with anxiety is bright: randomized clinical trials demonstrate that approximately two-thirds of youths who receive CBT show clinical improvement, and rates are even higher when treatment is combined with antidepressant medication. Notably, the majority of studies of mixed child and adolescent samples did not find significant differences in outcomes between these age groups. Research also supports the versatility of CBT, with adolescents showing improvement when CBT is administered in alternative formats.

What can be said with regard to the reasonable concern that adolescents are more likely to be nonresponders to CBT? The data suggest that it is reasonable to conclude that adolescents and children have comparable positive response rates to CBT. Quality CBT for youths must be delivered in a flexible, developmentally sensitive fashion such that the cognitive, emotional, and social maturity of adolescents are not ignored. Indeed, research suggests that a developmentally tailored approach to CBT, compared with a "one size fits all" approach, predicts better outcomes for anxious youths (138). Indeed, there is a wealth of information available to guide developmentally sensitive treatment, including treatment manuals for anxiety designed solely for adolescents, as well as articles and texts on ways to modify existing treatments for application in adolescents (139–141). For example, Sauter et al. (33) outlined treatment modifications for adolescents at each step of the therapy process, including conducting assessments of CBT-relevant (cognitive) capacities, developmentally sensitive case formulation, motivation building, and use of age-appropriate language and treatment materials. In particular, taking a collaborative approach and integrating the youth's personal goals into treatment are central to adolescent engagement in CBT (26). CBT can align with the adolescent's normative strivings for autonomy (140), using exposure as a means to gain increasing independence. Such implementation modifications address concerns about the applicability and accessibility of CBT content for anxious adolescents.

Evidence from basic research suggests that adolescents, relative to other age groups, may be less responsive in fear extinction tasks, implicating attenuated treatment outcomes (32). However, classical conditioning paradigms used in experimental fear extinction are not true analogues of real-life exposure therapy. Unlike such experiments, CBT exposure tasks require youths to be active participants, interacting with the feared situations, vocalizing their fears, and reappraising

their beliefs and expected catastrophes with their therapists. Unlike in basic research, therapeutic exposure tasks are not done to them, but with them. Indeed, some research indicates that the postexposure processing with clinicians is a significant predictor of outcome (142). It is also worth noting that a positive treatment outcome is not simply an absence of anxiety, but rather the ability to cope with anxiety (e.g., reduction in interference). Fear extinction, as in basic extinction experiments, may not be the central mechanism by which exposure operates in CBT, and recent models of the mechanism of change postulate that exposures do not weaken fear structures but rather help patients develop new inhibitory meanings for the feared situation (inhibitory learning theory [143]). Such explanations cite the benefit of high anxiety levels throughout the exposure, and they are bolstered by the fact that new learning may occur in the absence of fear habituation (144) and that habituation is not uniformly linked to positive outcome (143). Thus, the conceptualization of exposure as the patient being "systematically desensitized to anxiety triggers through repeated exposures" as cited by Drysdale et al. (29), likely underestimates the complexity of exposure in youths.

In addition to receiving benefit from the several active components of CBT, patients benefit from other features that hold the program together, such as the therapeutic relationship/alliance. Research indicates that a strong therapeutic alliance is associated with treatment engagement and outcome (145), particularly when CBT is delivered without medication treatment (146). Whereas the development of autonomy involves distancing oneself from one's parents, many adolescents seek and value relationships with nonfamilial adults (147), and the therapeutic relationship may be particularly helpful for the adolescent's psychological well-being, with therapy as a context in which he or she can process normative adolescent stressors and experience support during a time of identity development.

Critics have cited the 50% to 70% remission rates (defined as being free of the principal diagnosis) and 60% to 80% response rates as too low, indicating that CBT is not working properly in adolescents (30). Although there is certainly room for improvement in outcomes—and research is needed to determine optimal treatment for CBT nonresponders—the outcomes for CBT in youth anxiety disorders are among the best seen for mental health problems in youths (for example, an 80% acute response rate for combination treatment with CBT and sertraline [67]). Moreover, gains are observed for some youths at long-term follow-ups, and successful treatment has preventive features for the sequelae of anxiety (41). As Ryan (148) remarked, "An 80% response is a high hurdle to surpass, but what a wonderful problem to have."

It is also important to recall issues that may be lost in meta-analytic findings. Remission rate may not be the gold standard for treatment outcome; youths who do not achieve remission may still experience meaningful reduction in anxiety and improvements on quality of life indices. Additionally, many randomized clinical trials for CBT are standardized to approximately 16 sessions. Teenagers who do not achieve remission at this posttreatment point may still be capable of

responding after a greater "dose" of CBT, as some have been shown to do after receiving more sessions (149). And given that adolescents are still within their developmental course (regarding school, work, interpersonal issues, independence), they remain in a stage of life that is notable for new and emerging anxiety-provoking situations. Finally, individual differences mean that some less responsive youths may have better outcomes in an alternative format, such as computer-based CBT or brief CBT.

In sum, basic research on fear extinction does not fully align with the processes and goals of real-life exposure. Conclusions from startle paradigms may not fully generalize to clinical settings. To suggest that CBT does not work for adolescents (30) is misleading at best and runs counter to accrued knowledge from outcome studies. Findings suggest that adolescents respond to CBT at rates comparable to those of children, although there remains potential for improved outcomes. Although adolescents present challenges in the therapy setting, such challenges can be addressed with individualized protocols that meet developmental needs.

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