Cognitive Behavioral Therapy in High-Functioning Autism: Review and Recommendations for Treatment Development

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Abbreviations

ADHD	Attention deficit hyperactivity disorder
ADI-R	Autism diagnostic interview – revised
ADOS	Autism diagnostic observation schedule
ASDs	Autism spectrum disorders
CARS	Childhood Autism Rating Scale
CBT	Cognitive behavioral therapy
CGI	Clinical global improvement
DSM-IV-TR	Diagnostic and Statistical Manual of Mental Disorders 4th edition
NIMH	National Institutes of Mental Health
OCD	Obsessive – compulsive disorder
ODD	Oppositional defiant disorder
PCIT	Parent – child interaction therapy
PDD-NOS	Pervasive developmental disorder not otherwise specified
RCT	Randomized control trial
RUPP	Research Units on Pediatric Psychopharmacology
SRS	Social Responsiveness Scale
SSED	Single subject experimental design
SST	Social skills training

Introduction

Individuals with autism spectrum disorders (ASDs) who have acquired functional communication strategies – particularly more cognitively able individuals at or beyond the elementary school age group – may be candidates for talk-based therapies similar to those employed with children and adults with mental health disorders,

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such as anxiety (e.g., cognitive behavioral therapy, CBT). While talk-based therapies are widely used in community settings for school-aged youth and adults with ASD (Hess et al. 2008), the evidence base for using many such treatments is surprisingly weak. Compared to other types of intervention in autism (e.g., applied behavior analysis for young children) and interventions for other types of neurodevelopmental disorder (e.g., attention deficit/hyperactivity disorder, ADHD), there are very few well-designed studies of CBT and other talk-based therapies for individuals with autism. Of those studies that have been conducted, results are mixed, requiring a careful comparative analysis of the extant treatment literature to distinguish potentially promising practices from those that are less promising. This chapter endeavors to provide such an analysis and, in so doing, to draw preliminary conclusions about worthwhile practices currently available for implementation, as well as to identify directions for further development of treatment techniques.

We begin by defining the parameters of CBT and related talk-based therapies as distinguished from other behavioral interventions for individuals with ASD. CBT treatments are based upon cognitive science models of behavior, emotion, and thought; contemporary CBT treatments have been particularly influenced by the memory retrieval competition model (Brewin 2006). Conceptualized in information-processing terms, CBT aims to promote *retrievable memories* of adaptive responses that can successfully compete with and suppress memories of previously learned maladaptive responses evoked under "real world" conditions outside the therapy office. CBT methods used to achieve this are psychoeducation (learning about the nature of one's mental health condition), Socratic questioning and collaborative discussions to build up awareness of thought and emotion and to teach thought- and behavior-based coping skills, and behavioral experimentation, in which alternative responses to challenging situations are attempted in real-world settings and then reflected upon in structured discussions in order to build up potent memories of adaptive patterns of thought and behavior for future use in similar (not necessarily identical) situations.

A fundamental difference between CBT and strictly behavioral treatments (e.g., operant or classical conditioning-based models) is the conceptualization of mechanisms of change and complementary intervention techniques. While purely behavioral interventions assume that largely automatic (and unobservable) learning processes (e.g., extinction; associative learning; modeling) promote behavioral change and symptom remission, CBT-based models seek to promote changes in thinking and volitional behavior (e.g., identifying and challenging maladaptive interpretations of social situations) that are adaptable to multiple situational contexts. A simple example of phobia treatment illustrates differences between CBT and purely behavioral approaches: in the former, catastrophic beliefs about a feared stimulus would be identified and challenged to build up to facing the phobic stimulus and, after habituation occurs, the therapy would promote the development of principles for thinking about the feared stimulus differently to build a benign memory schema of the stimulus that could compete with and suppress the fearful schema that the patient had prior to treatment (Wood and McLeod 2008). The need for such competition stems from the cognitive science finding that prior memory schemata cannot be "deleted" and are often prone to return and override insufficiently developed alternative (adaptive) schemata. In contrast, a purely behavioral approach would involve gradual exposure to a feared stimulus to achieve extinction of the conditioned (fearful) response with no emphasis on related thoughts; and when fear and

avoidance were eliminated in one setting, the procedure might be repeated in several other settings in an effort to achieve generalization (Brewin 2006). Clearly, the putative learning processes and corresponding techniques used to promote change differ significantly in these two types of treatment (further description of CBT technique is given below, in "Enhancing CBT Treatments for ASD Symptoms").

It is important to note that while differentiation between CBT and non-CBT interventions can be made easily at a conceptual level, there can be some ambiguity in this distinction in practice because treatments used in many clinical trials are often summarized so succinctly that it is difficult to ascertain how much emphasis is given to cognitive behavioral techniques. Also, the simple fact that language is used as an element of treatment, for example, clearly does not distinguish CBT from other autism interventions; many non-CBT interventions, such as applied behavior analysis, joint attention training, or imitation training, often use substantial amounts of therapist-initiated speech during the interventions, with the goal of eliciting target verbal or nonverbal behaviors during the therapy sessions (e.g., coordinated eye gaze, commenting, and pointing). One factor that differentiates CBT and related mental health therapies from other autism interventions is the way in which speech and language are used during treatment. As noted above, in CBT and related therapies, verbal communication between therapist and patient is partly used as a means to identify and challenge specific thoughts, such as realistic versus irrational beliefs. Another factor that often differentiates CBT and related mental health therapies from other behavioral treatments in autism is that the explicit goals of treatment are often in the domains of psychiatric symptomatology in the former.

Two methodological factors that often differentiate clinical trials of CBT in autism from other behavioral interventions in autism are the types of outcome measures used to document efficacy and the age groups included in the interventions. In defining desirable study features for research intended to establish efficacious treatments, Chambless and Hollon (1998) noted that it was important that valid and reliable measures of symptom counts or diagnostic status, preferably including those rated by an evaluator blind to treatment status and study hypotheses, be used as primary outcome measures. Of the small number of controlled trials of CBT for individuals with ASD, most have included this kind of measure. Many of these have focused on comorbid mental health features, such as anxiety (Chalfant et al. 2007), and one of these trials utilized a parent-rated measure of core autism symptoms that is norm-referenced and used in the diagnosis of ASD (Wood et al. 2009a). In comparison, many treatment studies of other behavioral interventions for autism, such as variants of applied behavioral analysis, have often utilized:

- Observational measures with high specificity to the treatment (e.g., imitation) that have good external validity and often evidence of inter-rater reliability but rarely have evidence of concurrent or convergent validity from psychometric studies and have unknown utility as measures of ASD diagnostic status or symptomatology
- Direct measures of receptive and expressive language with good psychometric properties that nonetheless are not specific to core autism symptoms per se (but rather, measure diagnostically nonspecific aspects of language acquisition and proficiency)
- General measures of intellectual ability that do not reflect core autism symptoms
- Nonspecific measures of social skills or social adjustment that are not typically used in the evidence-based assessment of ASD

The distinctions in choice of outcome measures in clinical trials of CBT versus other behavioral interventions in ASD do not necessarily reflect fundamental differences between these treatments, although it is possible that measure selection (or publication of specific outcomes illustrating significant treatment effects) indirectly indicates the putative domains most likely affected by differing interventions.

Second, most studies of non-CBT social awareness interventions have been conducted with toddlers or preschoolers with ASD (see Chap. 6), whereas almost all studies of interventions described as "CBT" or "mental health interventions" for ASD have been with elementary school children or older individuals. Interestingly, some of the interventions designated as CBT with an emphasis on social skills outcomes (Bauminger 2002) have utilized intervention methods similar to some social awareness training procedures used with preschoolers (Ingersoll et al. 2007), which raises the question of whether a false dichotomy has indeed been established and that terms such as CBT have at times been used to describe interventions for older individuals that are similar in content to interventions with different names that have been used with young children. Traditionally, CBT and other forms of psychotherapy for mental health disorders have been studied primarily with school-aged children and older individuals. Maintaining this tradition in the field of autism treatment may be sensible for descriptive purposes, but the potential overlap between such therapies and those with different names used with younger children with ASD should be acknowledged.

Given the overlapping nature of goals and methods of CBT and other behavioral interventions for ASD, as well as the pragmatic value of minimizing overlap in the review of studies with other chapters in this book, we focus forthwith on interventions that use verbally mediated language to discuss an individual's thoughts, problems, and solutions (not merely for modeling or prompting), that are conducted with school-aged children or older, and that attempt to reduce the symptomatology of a mental disorder, including ASD or a comorbid mental health problem, as measured by diagnostically specific outcome assessments. We also consider other interventions that are explicitly described as "CBT" by the treatment developers, even if they do not meet all of these three criteria, for the sake of comparison.

Psychiatric Comorbidity in ASD

The majority of the clinical trials reviewed in this article focused on psychiatric comorbidity (e.g., anxiety), as opposed to core autism symptoms, as the primary target of treatment and outcomes assessment. Hence, a brief overview of psychiatric comorbidity among youths with ASD is now given. Numerous descriptive studies of comorbidity in more or less representative samples of youths with ASD have been conducted over the past decade and conclusions are relatively homogeneous: in general, there are very high rates of comorbid disorders in youth on the autism spectrum, well exceeding typically developing youth as well as youth with other (serious) mental health conditions such as conduct disorder (de Bruin et al. 2007; Green et al. 2000; Russell and Sofronoff 2005; Sukhodolsky et al. 2007). Social anxiety in particular occurs at higher rates in youths with ASD than in the typically developing population, with results from a number of studies indicating 20–57% of children and adolescents with high functioning ASD exhibit clinically relevant symptoms of social anxiety (Kuusikko et al. 2008; Muris et al. 1998; Simonoff et al. 2008), as compared to 1–5% in typically developing

youth. Depressive disorders often increase significantly in adolescence among youths with ASD, and attention deficit and disruptive behavior disorder profiles are also very common in youth on the autism spectrum. Comorbidity in ASD is not without its controversies. For example, the latest version of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; APA 2000) prohibits a comorbid diagnosis of ADHD among those with an ASD, whereas the earlier version did not (APA 1994).

The most common hypotheses about psychiatric comorbidity in ASD have been that there may be a common genetic linkage between ASD and other psychiatric disorders, increasing the risk of each; that the stresses caused by having an ASD (e.g., social rejection, sensory overresponsiveness, confusion in light of communication challenges) overwhelm coping skills and induce emotional and behavioral disorders; or that core autism symptoms are sometimes "counted as" aspects of a comorbid disorder that has phenotypically similar features (Baron-Cohen 1989; Bellini 2006; Gadow et al. 2008; Gillott et al. 2001; Groden et al. 2006). For example, the social avoidance characterizing many youth on the spectrum – stemming from low social motivation and restricted interests – could be mistaken for social anxiety, which also can manifest, in part, as social avoidance. Although this is an important point in terms of psychiatric nosology, it may have less import in the realm of treatment. This is because symptom reduction is likely to be helpful whether the symptoms ultimately reflect a separate psychiatric disorder or are simply a manifestation of autism that is causing adaptive difficulties.

Linkages between comorbid psychiatric symptomatology and functional problems in youths with ASD are both self-evident and empirically documented. For example, a very hyperactive child is going to have greater adaptational challenges in a classroom than one who is not, all other things being equal. A depressed child preoccupied with unpleasant thoughts will have a lower quality of daily life than one who is not. A growing body of research has demonstrated links between high anxiety in ASD and a number of functional impairments, such as poor social responsiveness and other social skill deficits (Bellini 2004; Sukhodolsky et al. 2008) and increased ASD symptom severity (Ben-Sasson et al. 2008; Kelly et al. 2008). In short, whether comorbid symptoms and disorders are entirely distinct from an individual's core autism spectrum disorder or not, there is clearly a relationship between the presence of such symptoms and more overall impairment and distress in affected youth, underscoring the importance of treatments that can relieve such symptoms.

A Review of CBT and Related Mental Health Treatments in ASD

This section is organized around treatment studies for (a) comorbid anxiety and mood problems; (b) comorbid disruptive behavior problems; and (c) core autism symptoms (as well as nonspecific social problems). In each subsection, the nature of the problem (e.g., anxiety) and relevance to individuals with autism is discussed, the extant treatment literature is reviewed, and each study is abstracted in tabular format and rated according to the criteria for strong, adequate or weak research methodology described in Chap. 2.

Anxiety and Mood Disturbance

Anxiety disorders are common among youth and adults with ASD, as noted above (de Bruin et al. 2007; Green et al.

2000; Klin et al. 2005; Leyfer et al. 2006; Muris et al. 1998). Among the more common anxiety disorders in the DSM-IV-TR (APA 2000) are generalized anxiety disorder, typified by disabling worry; separation anxiety disorder, characterized by intense fear of separating from caregivers; obsessive–compulsive disorder (OCD), involving repeated intrusive thoughts and rituals; and social phobia, characterized by a fear of humiliation and corresponding avoidance of specific social situations. A recent survey conducted by the National Autistic Society found that anxiety was the second most highly cited problem reported by parents of children with ASD (Mills and Wing 2005). Often, additional comorbid disorders coincide with anxiety disorders in the ASD population (e.g., oppositional defiant disorder, ODD), resulting in complex and severe clinical presentations (de Bruin et al. 2007; Klin et al. 2005; Muris et al. 1998).

CBT is a well-supported treatment modality for otherwise typically developing youth with anxiety disorders (Walkup et al. 2008). Some promising research on adapted CBT for youths with ASD and comorbid anxiety disorders has emerged in recent years. Sofronoff et al. (2005) evaluated two variants of a 6-week CBT program in group-therapy format that focused on emotion recognition and cognitive restructuring for children with Asperger syndrome. Parent-report measures showed declines in child anxiety symptoms in the CBT groups as compared to a wait-list group; however, participating children did not necessarily meet criteria for an anxiety disorder at pre-treatment. Similarly, in 12- and 16-week group-therapy CBT interventions for comorbid anxiety and ASD in children, Chalfant et al. (2007) found that anxiety outcomes were superior for the immediate treatment group relative to the wait-list arm. However, noteworthy limitations of these studies were that the study therapists, rather than independent evaluators blind to treatment assignment, administered the post-treatment diagnostic interviews; and that treatment fidelity was not assessed. Reaven et al. (2009) studied 33 children (aged 8–14 years) with ASD and comorbid anxiety disorders, assigning them (using a nonrandomized assignment paradigm) to immediate treatment in group-therapy format CBT or a wait-list. Outcome measures were child- and parent-reported anxiety symptoms using psychometrically sound questionnaires. Youth in the immediate treatment group improved more than the wait-list group on parent-reported symptoms, but not child-reported symptoms. This may have been attributable to low pre-treatment child-report symptom scores.

In one study adhering to Chambless and Hollon's (1998) suggested research methodology for clinical trials research (Wood et al. 2009b), 40 children aged 7–11 years were randomized to either 16 sessions of a manualized, individualized CBT program plus two school consultation sessions or to a waiting list. CBT in this study incorporated coping skills training (e.g., identifying "calm" thoughts) and in-vivo exposure elements (facing fears hierarchically) as well as significant parent- and teacher-training components to ensure that new behaviors and ideas were practiced in school and home settings rather than just in therapy sessions. The program incorporated various motivational elements (e.g., use of children's special interests as examples of concepts; use of a comprehensive reward system during sessions and at home) to maintain engagement and to promote the recall of adaptive responses over maladaptive counterparts. Participating children had an average of 4.18 psychiatric disorders at intake. Despite the high level of comorbidity, children randomized to CBT had primary outcomes comparable to those of other studies treating childhood anxiety in typically developing patients (Barrett et al. 1996; Wood et al. 2006), with large effect sizes for most

outcome measures; remission of all anxiety disorders for over half of the children by post-treatment or follow-up; and a high rate of positive treatment response on the Clinical Global Impressions – Improvement scale (CGI-I) (78.5% from intent-to-treat analyses). As with the Reaven et al. (2009) study, child-reported anxiety did not differ significantly from pre-treatment to follow-up; however, a floor effect was expected, as baseline levels were low and decreased with treatment.

Collectively, these studies and other pilot work using case studies or AB designs (Lehmkuhl et al. 2008; Ooi et al. 2008; Sze and Wood 2007, 2008) indicate that CBT is a promising modality for anxiety in the ASD population. Although CBT was a general treatment approach used in each of these studies, with a focus on challenging irrational fearful beliefs and developing rational beliefs as a common treatment element, other elements of treatment varied widely. It should be noted that one of the more influential clinical trials of CBT for pediatric anxiety disorders in typically developing children and youth (Kendall et al. 1997) convincingly demonstrated that the *cognitive* intervention aspects of the treatment (e.g., challenging irrational beliefs) alone – when not paired with in vivo exposure elements – do not appear to be even modestly effective in reducing children's anxiety levels. However, the CBT programs evaluated for individuals with ASD and high anxiety varied widely with regard to the emphasis placed on in vivo exposure relative to less active treatment elements (e.g., cartooning, role-playing). At the extremes of the continuum, the Wood et al. (2009b) RCT involved in vivo exposure at home on a daily basis for the majority of the 16-session treatment, which spanned 4–5 months for most youth; whereas the Sofronoff et al. (2005) six-session treatment focused entirely on a series of creative anxiety management skills tailored for youths with ASD but with no explicit in vivo exposure elements. Some (but not all) CBT trials conducted with typically developing children and youth with anxiety disorders (Barrett et al. 1996; Barrett 1998; Wood et al. 2006) have found that including parent training in the intervention leads to superior intervention effects as compared to exclusively child-focused treatments. Many of the group design studies for youths with ASD and high anxiety included concurrent child- and parent-intervention components. Sofronoff et al. (2005) included two active treatment groups – one with child-only treatment and one with concurrent child- and parent-treatment – and found some evidence suggesting that combined child and parent treatment was more effective than solely working with the children at both post-treatment and the follow-up assessment. This is an impressive finding given the relatively brief duration of this treatment.

The majority of the treatment programs studied in group design studies used a group-therapy treatment format with a structured sequence of sessions for all participants. In comparison, the Wood et al. (2009b) study used an individual therapy format with modular design (Chorpita et al. 2004) in which individual treatment components were selected by the therapist and supervisor on a session-by-session basis using a clinical algorithm matching the client's presenting characteristics and most pressing clinical needs with corresponding treatment elements. As an example, a child who was socially isolated at school would receive a social coaching module, in which social approach behaviors are broken down into steps, anxious beliefs about each step are discussed and rationalized, and then steps are practiced in various real-world settings such as parks and school playgrounds repeatedly until a sufficiently advanced level of the skill (e.g., joining recess games) is evidenced consistently. The same child would also be a candidate

for the peer buddy module in which select peers at school would be trained to invite and include the target child in games and conversations to reduce the level of difficulty for the targeted social behaviors. No clinical trials thus far have compared the relative efficacy of structured group-format CBT interventions with individually administered, modularized interventions of this kind and it will be important to determine whether the more complex and clinically challenging modular approach is indeed necessary.

White and Roberson-Nay (2009) have suggested that social anxiety may be related specifically to social loneliness (vs. emotional loneliness) and could possibly mediate the child's level of involvement in activities with peers. This potential link between anxiety and social engagement has led to the investigation of the effects of social skills interventions on anxiety outcomes in youths with ASD in an interesting recent trial. Cotugno (2009) examined the effectiveness of a 30-week social skills group intervention for 18 children (ages 7–11) diagnosed with ASD. Children were split into older (ages 10–11 years) and younger (ages 7–9 years) groups. Cotugno employed a peer-based group model within a cognitive-developmental framework, using a combination of group therapy, cognitive-behavioral, and social skill instruction techniques in order to address the social competency needs and concerns of the children with ASD. In addition, the intervention took into account which one of five predetermined stages of group development the children were in, with each stage specifying the processes and sets of behaviors necessary to pass through to the next stage. Each stage focused on different elements of group formation and cohesion while fostering relationships between group members. Measures of anxiety at post-treatment showed that both the younger and older groups of children showed significant improvements in parent ratings of anxiety; however the younger group showed a greater positive shift than the older group. The results of this study provide some support for the relationship between social skills and anxiety, and give some evidence to the positive effects of a social skills intervention on anxiety in children with ASD. However, Cotugno did not use an evidence-based measure of anxiety, instead using two items from the MGH YouthCare Social Competency/Social Skill Development Scale that focused on the child's level of stress and anxiety management. Further research examining the link between social skills training and anxiety should include additional anxiety measures in order to gain a better understanding of the nature of this relationship.

Table 7.1 presents a summary of the characteristics of the CBT interventions that have been evaluated in previous studies of individuals with ASD and concurrent anxiety and mood problems. It should be noted that although the research methodology was less sophisticated in the majority of the studies in this group, of those with stronger methods, treatment outcomes were promising.

Disruptive Behavior Problems

Children with ASD often present with comorbid disruptive behavior disorders such as ADHD or ODD (de Bruin et al. 2007; Klin et al. 2005; Muris et al. 1998). As noted above, DSM-IV-TR (APA 2000) rules out the concurrent diagnosis of ADHD when an ASD is diagnosed, but there is a controversy over whether or not this exclusion should be continued in future versions of the DSM. Some researchers have found evidence suggesting that a comorbid diagnosis of ADHD should be allowed due to the clinically distinct representation of ADHD in children with autism compared with children that are diagnosed with only one of these disorders (Goldstein and Schwebach 2004; Reiersen and Todd 2008;

TABLE 7.1 Clinical trials and case studies of treatments for anxiety in individuals with ASD

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Cardaciotto and Herbert (2004)	• $N=1$ • 23-year-old male • Diagnosed with Asperger syndrome and social anxiety disorder	• Case study	• Manual • No treatment fidelity measure • 14 weekly sessions • Individual CBT	• Self-report measure of social phobia symptoms • Clinician's rating of impairment	• Weak	• Self-report measures of social phobia symptoms within normal limits (40th percentile) • Clinician rating of impairment was "very much improved"
Chalfant et al. (2007)	• $N=47$ • 8–13 years old • 34 males	• Randomized controlled trial (wait-list control)	• Manual • No treatment fidelity measure • Twelve 2-h sessions • Group CBT • Parent and child groups	• Semi-structured diagnostic psychiatric interview for anxiety disorders • Parent- and child-report measures of child anxiety	• Adequate	• Significantly more subjects in the immediate treatment condition no longer met criteria for any anxiety disorder, compared to the wait-list condition • Self-report measures had significant group x time interactions
Cotugno (2009)	• $N=18$ • 7–11 years old • Diagnosed with ASD	• Open trial	• No manual • No treatment fidelity measure • 30 weekly 1-h sessions • Group social skills training	• Teacher-report measure of social-behavioral adjustment • Parent-report measure of social competency and social skill development	• Weak	• Significant increase in positive social behavior • Significant increase in school adjustment • Significant improvement in stress and anxiety management and flexibility with transitions

(Continued)

Table 7.1 (Continued)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Lehmkuhl et al. (2008)	• $N=1$ • 12-year-old male • Diagnosed with high-functioning autism and obsessive–compulsive disorder	• Case study	• Manual • No treatment fidelity measure • 10 sessions of 50 min • Individual CBT	• Semi-structured diagnostic psychiatric interview for obsessive–compulsive disorder • Child-report measure of obsessive–compulsive disorder	• Weak	• Post-treatment OCD score within normal limits based on interview • Post-treatment OCD within normal limits on self-report • Both treatment gains maintained at the 3-month follow-up
Ooi et al. (2008)	• $N=6$ • 9–13 years old • Diagnosed with ASD	• Open trial	• Manual • No treatment fidelity measure • 16 sessions of 90 min • Group CBT	• Parent- and child-report measures of child anxiety	• Weak	• No statistically significant findings
Reaven et al. (2009)	• $N=33$ • 8–14 years old • 26 males • Diagnosed with ASD and anxiety disorders	• Group • Comparison without random assignment	• Manual • Fidelity checklists • 12 sessions of 90 min • Group CBT • Parent and child groups	• Parent- and child-report measures of child anxiety	• Adequate	• Significant decrease in severity of • Anxiety in the immediate treatment group versus wait-list group on parent report of anxiety symptoms

Reaven and Hepburn (2003)	• $N=1$ • 7-year-old female • Diagnosed with Asperger syndrome and obsessive–compulsive disorder	• Case study	• Manual • No treatment fidelity measure • 14 sessions • CBT • Medication	• Semi-structured diagnostic psychiatric interview for obsessive–compulsive disorder	• Weak	• Lowered OCD score by the end of treatment • Most of the original symptoms remitted
Sofronoff et al. (2005)	• $N=71$ • 10–12 years old • 62 males • Non-standardized report of high anxiety	• Randomized controlled trial	• Manual • Fidelity checklists; 25% sessions videotaped and coded for fidelity • Weekly supervision • Six 2-h sessions • Three groups (child; child and parent; wait-list)	• Parent-report measures of child anxiety and social worries	• Adequate	• Parent report of anxiety yielded a main effect of time and a time x group interaction (both treatment groups better than wait-list; combined group with greatest improvements)
Sze and Wood (2007)	• $N=1$ • 11-year-old female • Diagnosed with high-functioning autism and three anxiety disorders	• Case study	• Manual • No treatment fidelity measure • Weekly therapist supervision • 16 sessions of 90 min • Family CBT	• Semi-structured diagnostic psychiatric interview for anxiety disorders	• Weak	• No longer met criteria for separation anxiety, generalized anxiety, or obsessive–compulsive disorder after treatment

(Continued)

Table 7.1 (Continued)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Sze and Wood (2008)	• $N=1$ • 10-year-old male • Diagnosed with Asperger Disorder and two anxiety disorders	• Case study	• Manual • No treatment fidelity measure • Weekly therapist supervision • 16 sessions of 90 min • Family CBT	• Semi-structured diagnostic psychiatric interview for anxiety disorders • Clinician's rating of impairment • Parent-report measure on child anxiety symptoms	• Weak	• No longer met criteria for generalized anxiety or social phobia after treatment • Clinician rating of impairment "very much improved" • Shifted from clinically significant to normal on parent measure of anxiety (lowered ~1 SD)
Wood et al. (2009b)	• $N=40$ • 7–11 years old • 27 males • Diagnosed with ASD and an anxiety disorder	• Randomized controlled trial (wait-list control)	• Manual • Fidelity assessed • Weekly therapist supervision • 16 sessions of 90 min • Family CBT	• Semi-structured diagnostic psychiatric interview for anxiety disorders • Clinician's rating of impairment	• Strong	• 64% in the immediate treatment condition no longer met criteria for an anxiety disorder • 92% of immediate treatment group showed a positive treatment outcome based on clinician's rating

[a]The quality was assessed using the criteria described by Reichow (Chap. 2)

Koyama et al. 2006). Others have found that individuals with ASD and ADHD scored similarly on several measures assessing these disorders, making it difficult to differentiate between the two (Hattori et al. 2006). The presence of disruptive behavior problems in many children with ASD has led researchers to investigate various interventions targeting these behaviors.

Parent–Child Interaction Therapy (PCIT) is a well-supported intervention model for typically developing children with externalizing disorders. A pilot study for the use of PCIT for externalizing disorders for children with comorbid ASD has yielded promising findings (Solomon et al. 2008). In this study, 19 male participants, aged 5–12 years were randomly assigned to an immediate treatment or wait-list condition, matched by age, cognitive level, and behavioral symptoms. Treatment consisted of 12 weeks of modified PCIT in which the parents were trained by therapists in child-directed interaction for 6 weeks and in parent-directed interaction for 6 weeks. During the child-directed interaction sessions, parents were coached by therapists to praise and reinforce appropriate behaviors and ignore inappropriate behaviors. In the parent-directed interaction sessions, parents were trained to give clear, simple commands and consistently reinforce child compliance. Areas of the treatment that were adapted especially for children with ASD were prohibiting children from talking excessively about special interests, redirecting children's attention, and giving praise for children's initiations of interactions. On parent reports of behavioral problems and atypicality, several group by time interaction effects emerged, showing a statistically significant difference between the immediate treatment and wait-list conditions at post-treatment. Other scales of externalizing behavior did not differ between groups, but main effects of time were generally evident, showing a decrease in both groups. The limitations to this study included only assessing problem behaviors through parent reports, a small sample size, and no formal measure of treatment fidelity.

In a randomized controlled trial of CBT conducted by Sofronoff et al. (2007), 45 children (aged 10–14 years) diagnosed with Asperger Syndrome and initially rated as high in anger were assigned to either a 6-week immediate intervention group or a wait-list group. Treatment consisted of 6 weekly 2-h sessions for both child and parent. The manualized therapy sessions focused on exploring positive and negative emotions, cognitions related to coping with anger, Social Stories to promote emotion management, and designing individualized coping plans for anger management. There was a significant reduction in the number of parent-reported anger episodes after treatment in the immediate intervention group, with gains maintained 6 weeks after treatment completion. Qualitative interviews conducted with participants' teachers post-treatment revealed participants' use of strategies they had learned through the program to manage their anger within their classroom. One methodological weakness in this study was that no diagnostic criteria or operational definition of an externalizing disorder was used for case selection at pre-treatment. In addition, all outcome measures were parent-report, with the exception of the qualitative interviews with teachers.

Other types of structured mental health treatments for youth with externalizing disorders and ASD that have been explored include multimodal approaches and mindfulness training. In a case study of a multimodal treatment for a 9-year-old boy diagnosed with PDD-NOS and externalizing behavior problems, a manualized behavioral treatment summer camp program, medication, behavioral parent training, and school consultations were employed for 4 years (Wymbs et al. 2005). According to the case description, the combined therapy

was successful in promoting some prosocial behaviors and reducing targeted problem behaviors in the participant. Mindfulness training has also been explored as a potential treatment for children with externalizing disorders. In one study by Bögels et al. (2008), 14 children aged 11–18 years with externalizing problems (four of whom had an ASD diagnosis and ten of whom had other diagnoses) completed eight group sessions of adapted mindfulness-based cognitive therapy. Parents also received eight group training sessions. Unfortunately results were not broken down by entry diagnosis so it is impossible to determine how effective this treatment was in ASD per se. Nonetheless, overall results showed significant improvement on child reports of externalizing behaviors and inattention; parent reports, on the other hand, showed few changes on the key study outcomes of disruptive behavior. These effects were maintained at an 8-week follow-up. As with other studies of disruptive behavior treatments in ASD, this study had its weaknesses, including a small sample size, a lack of a randomized experimental design, and no teacher report measures.

On the whole, there have been relatively few studies in this area and only two of the four studies reviewed achieved a methodological rating of even Adequate (see Table 7.2) according to the criteria described by Reichow et al. (2008). The modification of PCIT by Solomon et al. (2008) is especially promising as it is based upon a well-established behavioral intervention for externalizing disorders in otherwise typically developing children that has yielded large effect sizes and good maintenance of treatment effects in disruptive behavior disorders. The modifications for ASD made by Solomon, Ono and their colleagues were thoughtful and appropriate. The methodology of PCIT resembles that of many applications of applied behavior analysis for ASD, so it is unclear whether this intervention would offer anything above and beyond what children receiving good quality ABA would already be getting. However, this is an empirical question that could easily be tested. The intervention by Sofronoff et al. (2007) was developed specifically for ASD and takes a more cognitively based approach to anger management than the largely behavioral PCIT approach. Although this study had the weakness of not enumerating cases with a specific diagnostic algorithm, the intervention methods are unique and may be a basis for further treatment development. As with the anxiety trial (Sofronoff et al. 2005), it is impressive that significant results were attained after only six treatment sessions. Finally, while the study by Bögels et al. (2008) was not specific to ASD and thus does not offer specific guidance about applicability to autism and related conditions, the success that mindful awareness training has had with adult patients in large, structured clinical trials suggests that it could be a promising technique to address not only the behavior problems sometimes associated with ASD, but also the inattention that is a nearly ubiquitous feature of ASD, whether or not an ADHD diagnosis is specifically present.

Autism Symptoms and Social Impairment

A key goal in the field of autism treatment research is the discovery of methods that reduce or eliminate the primary symptoms of ASD (McDougle et al. 2005). Core autism symptoms are wide-ranging and multifaceted, spanning from specific social communication impairments such as deviant eye gaze, to language eccentricities such as echolalia, to repetitive behaviors such as stereotypies. A common finding is that individuals on the autism spectrum with categorically lower levels of ASD symptoms (e.g., those meeting criteria for PDD-NOS and not autism per se) have better overall

TABLE 7.2 Clinical trials and case studies of treatments for disruptive behavior in individuals with autism spectrum disorder (ASD)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Bögels et al. (2008)	• $N=14$ • 11–18 years olds • 8 males • Primary diagnosis of ADHD, ODD/CD, or ASD	• Open trial (within subject wait-list)	• Manual • No treatment fidelity measure • Weekly therapist supervision • 8 weekly sessions of 90 min • Child and parent groups	• Child personal goals • Parent goals for child • Parent personal goals	• Weak	• Significant differences on personal goals from pre- to post-treatment for goals • Gains were maintained at the 8-week follow-up
Sofronoff et al. (2007)	• $N=45$ • 10–14 year olds • 43 males • Diagnosis of ASD • Caseness determined by reports of high levels of anger	• Randomized controlled trial (wait-list control)	• Manual • Weekly therapist supervision, weekly therapist checklist, and 25% of sessions were videotaped • 6 weekly sessions of 2 h • Child and parent groups	• Parent-report measure of child anger • Parent-report measure of relationship with authority subscale	• Adequate	• Parent report of child anger showed a main effect of time for the immediate treatment group • Relationship with authority subscale had a significant time × group interaction
Solomon, Ono, et al. (2008)	• $N=19$ • 5–12 year olds • All male • Diagnosed with ASD • High levels of disruptive behavior	• Randomized controlled trial (wait-list control)	• PCIT manual • No treatment fidelity measure • Two phases (six sessions each): child-directed interaction and parent-directed interaction • Group supervision	• Parent-report measures of child conduct problems, behaviors, and emotions	• Adequate	• Parent reports of conduct problems and atypicality yielded a group × time interaction • Several scales reflecting externalizing behavior had nonsignificant group differences as well

(Continued)

Table 7.2 (Continued)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Wymbs et al. (2005)	• $N = 1$ • 9-year-old male • Diagnosed with PDD-NOS and ADHD	• Case study (4 years)	• Manual • No treatment fidelity measure • Multimodal behavioral and medical treatment	• Rate of teasing • Peer nominations	• Weak	• Rates of teasing decreased during treatment • Mixed results with regard to peer • Nominations (some increase in positive nominations, but also some increase in negative nominations)

[a]The quality was assessed using the criteria described by Reichow et al. (2008)

prognoses than those with categorically higher levels (e.g., those meeting full DSM-IV criteria for autistic disorder) (Helt et al. 2008). Logically, interventions need to reduce core autism symptoms as much as possible to improve prognosis. Evidence of such change should be documented in clinical trials by using as outcome measures those "gold standard," evidence-based assessments of core autism symptoms that are used to diagnose autism and determine symptom severity. Such assessments include, for example, the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 1999), Autism Diagnostic Interview – Revised (ADI-R; Le Couteur et al. 2003), and the Childhood Autism Rating Scale (CARS; Schopler et al. 1998). Use of such measures would parallel those evidence-based, symptom-count and diagnostic measures used in studies of the treatment of comorbid psychiatric disorders in ASD, such as anxiety disorders (Chalfant et al. 2007), in which the same instruments used to diagnose the disorder – rather than features associated with the disorder, such as social maladjustment or cognitive bias – are employed as primary outcome measures, following contemporary methodological best practices for clinical trials (Chambless and Hollon 1998).

Despite the clear rationale for using such evidence-based measures of core autism symptoms as primary outcomes in ASD behavioral intervention research, these types of assessment have rarely been used in clinical trials, whether in studies of applied behavior analysis, social awareness interventions, or CBT or mental health interventions for autism. This trend is, in part, related to the tradition in studies of applied behavior analysis to employ single subject experimental designs (SSED), such as multiple baseline designs and reversal designs to evaluate treatment effects on observable target symptoms. While such measures frequently index specific core autism symptoms (e.g., presence of observed stereotypies), such measures are not used in the evidence-based diagnosis of ASD and thus cannot be construed as indicators of the overall severity of an individual's autism-spectrum symptom profile at post-treatment (e.g., even with stereotypies completely eliminated through a behavioral treatment, many other ASD symptoms can remain present which may maintain a bleak prognosis based on actuarial prediction were a broader, evidence-based assessment of autism to be administered). Seemingly, many of the classic SSED trials have been conducted to demonstrate the *capacity* of an intervention approach to markedly affect the expression of specific autism symptoms or related problems (e.g., poor adaptive skills). Due to the nature of SSEDs – specifically, the need for many repeated measures – trials using this design have generally not utilized broad measures of ASD symptoms as outcome measures, and even group design studies of treatments that might affect core autism symptom domains have typically not reported using evidence-based measures of autistic disorder (e.g., the ADOS), opting instead to employ nonspecific measures of, for example, social skills (e.g., as measured by the Social Skills Rating Scale). The handful of studies of CBT and related mental health interventions that have endeavored to address social communication deficits in autism have generally followed this pattern.

Bauminger (2002, 2007a, b) has conducted three open trials (AB designs without a control group) of CBT for school-aged children with ASD focusing on remediating a variety of social deficits. The intervention approach taken has been sophisticated and responsive to findings from basic research in autism. For example, Bauminger (2002) cites contemporary research suggesting that deficits in social initiations and understanding of complex emotional cues in social situations account for more of the deficit in social adjustment, such as friendship quality, among high-functioning children

with autism than do the effects of low social motivation or aversive social behavior (Sigman and Ruskin 1999). She also notes that core deficits in areas such as theory of mind skills – particularly in their application to social behavior – are considered critical social cognition targets for effective interventions to address. Finally, among the observable aspects of typical social behavior among high-functioning children with ASD in naturalistic settings, Bauminger (2002) notes that reduced frequency of social play (as opposed to, for example, solitary play or disengagement) is a distinguishing feature of many children on the spectrum that requires direct attention in intervention programs. The CBT interventions in the Bauminger (2002, 2007a, b) trials flow from this basic research by matching treatment goals to the pivotal areas identified in these studies. All three trials yielded evidence of improvement (although causal effects cannot be confirmed with the open nature of the studies) in social outcomes, again with some interesting variability. Each trial used excellent observational measurement paradigms, although, as with most other studies of interventions for ASD, evidence-based diagnostic measures of core ASD symptoms were not included in the assessment battery.

Bauminger (2002) references cognitive behavioral theory, noting that a CBT intervention for autistic social deficits must make the assumption that (sometimes maladaptive) cognition guides interpersonal behavior in youths with ASD; and that, therefore, (adaptive) alterations to cognitive structures can make a positive impact on interpersonal behavior. In this study, several elements were notable: children's classroom teachers were responsible for an intervention taking 3 h per week over 7 months conducted at school and which relied heavily on guiding a dyad consisting of the target child and a typically developing peer through a series of 13 social skill lessons (e.g., cooperating) that were to be practiced at recess, on the phone, on playdates, and so forth ($N = 15$; aged 8–17 years old). Parents were also asked to support children in learning and implementing these social skills. The intervention was presented by the teacher to the dyad, allowing for individualization (e.g., by having pairs of children choose activities that they both liked). After intervention, children approximately doubled their number of observed positive social interchanges with peers in naturalistic observations at school – particularly eye contact, expressions of interest in others, and talking about their own experiences. They were more likely to initiate positive interactions than they were to respond positively to peers' initiations to them. Teachers also rated children as improved in certain positive social skills on the Social Skills Rating Scale.

Bauminger (2007a) replicated these treatment and assessment procedures and included several additional assessment measures in an open trial of CBT for 19 youths with ASD, aged 7–11 years old. In this trial, the observational measure yielded slightly different outcomes. As before, there were significant pre- to post-treatment improvements in observed positive social behavior, but this time the specific social skills affected were initiating and responding to others with eye contact and sharing. There was a corresponding reduction of "low-level" social behaviors (e.g., repetitive behaviors). There was also a main effect of response type in which initiating social communication was more frequent than responding to it. However, children's self-reports of loneliness, social acceptance, and other aspects of self-worth did not change from pre- to post-treatment. A 4-month follow-up assessment provided evidence of maintenance of treatment effects. In short, this study was a successful replication of the 2002 trial, with similar limitations (e.g., no control group) but with a slightly different pattern of improvement in specific social behaviors and evidence

of durability of the treatment effect over a modest follow-up period. Clearly, this treatment model is promising and merits more thorough evaluation in a randomized trial.

A group-therapy CBT treatment (with between three and six children per group, at least half of whom were typically developing) with many commonalities with the Bauminger (2002) intervention but focusing more on within-group interaction as a vehicle for learning, was also evaluated by Bauminger (2007b). Again, an AB design was used ($N=26$) and, in addition to playground observations, a classic theory-of-mind task and a sorting task tapping executive functioning were administered as outcome measures. Interestingly, while there was substantial improvement in social behaviors amongst the therapy group members while interacting during the sessions from pre- to post-treatment, this effect did not generalize to the playground setting, in which no significant improvement was found in social behaviors over the course of the 7-month interval from baseline to post-treatment. However, there was evidence of improvement in both theory-of-mind abilities and executive functioning. While the former finding seems to flow from the emphasis placed on understanding others' perspectives in the intervention curriculum, the impact of the treatment on youths' sorting ability and concept formation in the executive functioning task is less easily explained and offers an intriguing path for further exploration in controlled trials. Overall, this study paralleled the results of most group-therapy-based "social skills interventions" (Rao et al. 2008), which generally improve social behaviors within the immediate group but fail to find a generalization effect in the child's social relationships outside the therapy program. Since Bauminger essentially adapted the therapeutic concepts and methods from her more individually oriented CBT interventions (2002, 2007a) for this group-therapy trial, it is worth considering whether there is more merit in individually oriented social interventions in autism (if, as Bauminger notes, the child's ecological influences are addressed through the individual intervention), as compared to group-based interventions, than has traditionally been assumed.

Lopata et al. (2006) conducted a randomized controlled group design study of an ASD intervention designated as "CBT" focused on improving social communication and social adaptive functioning. This study compared two versions of a 6-week, 5 days per week summer treatment program: intensive CBT emphasizing social skills training and the same CBT focusing on social skills training combined with behavioral management strategies. Twenty-one children participated, most of whom were randomly assigned to a condition. Impressively, the 6-h day was pre-programmed with repeated social skills training and practice opportunities, using a structured program plan to guide specific activities (e.g., starting conversations). Primary foci were social deficits characteristics of ASD; emotion recognition; and awareness of and engagement in interests other than one's own. Some attention to intervention fidelity was given. A nonspecific measure of outcome, the Behavior Assessment System for Children, was administered to teachers and parents at pre- and post-treatment. On three of the subscales reflecting social behavior, there were relatively consistent improvements from pre- to post-treatment for both treatment groups, with a few exceptions. The groups did not differ on any measure, precluding any causal implications from being drawn about the impact of either condition. Of potential note, the mean teacher ratings at pre-treatment were all in the normal range (the average score was within 5 or 6 T-score points of the population mean on all three subscales, suggesting teacher raters were not aware of the full spectrum of symptoms sometimes

displayed by the participants). Pre–post effect sizes were generally in the small to medium range. Given the unclear implications about the impact of the intervention per se, as well as the expense of about 180 h of treatment per student, it is difficult to draw conclusions about this treatment program, but the authors must be commended for attempting a large-scale behavioral intervention for school-aged children with ASD in a camp format – a modality that has had considerable success in the treatment of ADHD (Pelham et al. 2000).

In the other randomized controlled trial in this group of studies, Wood et al. (2009a) compared nine children with ASD (aged 7–11 years) randomized to CBT with 10 children randomized to a wait-list condition. The CBT treatment was as described in the Wood et al. (2009b) clinical trial for children with ASD and comorbid anxiety disorders. The CBT program emphasized in vivo exposure supported by parent training and school consultation to promote emotion regulation and social communication skills. Parents of the final 19 participants in the Wood et al. (2009b) study completed a standardized autism symptom checklist at baseline, post-treatment/post-wait-list, and 3-month follow-up assessments. The Social Responsive Scale (SRS) covers all the broad autism spectrum symptom domains found in higher-functioning individuals and has acceptable sensitivity and specificity for the prediction of ASD diagnoses (Constantino and Gruber 2005). There was a statistically significant difference between the CBT group and the wait-list group at post-treatment/post-wait-list on total parent-reported autism symptoms on the SRS, with a medium to large effect size. Treatment gains were maintained at 3-month follow-up. Of course, this study was limited by a small sample and reliance on parent reports of symptomatology, which are vulnerable to bias. Evidence-based assessments of core autism symptoms based on independent evaluators' ratings and direct observations of children's behavior (e.g., the ADOS) will need to be employed in future studies of such CBT programs to more convincingly determine their potential for reducing the expression and severity of core autism symptoms.

Table 7.3 presents a summary of CBT interventions evaluated in studies of individuals with ASD that have focused on addressing autism symptoms and social deficits. In this small group of studies, substantial variability in treatment methods, research design, and outcome measurement foci was again in evidence. As noted, the programs utilized summer camp, school, or clinic settings; relied on individual versus group treatment modalities; ranged from 16 weekly, 90-min sessions to 180 h of therapeutic camp activities compressed into 6 weeks; were more or less closely tied to CBT theory as well as basic research in autism; and used primary outcome measures ranging from questionnaire measures of nonspecific symptom domains, to behavioral observations of social initiation and responsiveness during recess, to parent reports of core autism symptoms on a validated, normed instrument. Common characteristics among the programs are that they relied on social ecological models of development and behavior change by directly intervening with peers, teachers, and parents; made efforts to promote adaptive social behavior within the children's peer milieus; and emphasized development of social cognitive skills such as perspective taking. There was some evidence of symptom improvement in each trial, although effect sizes varied widely, and evidence-based research methodology was variably employed. Some general conclusions may be drawn: CBT that emphasizes direct experiences in the child's social milieu and that is closely linked with conceptual training on others' perspectives and emotional states – especially when presented in an individualized format in a high-dose, high-density fashion in the middle-childhood

TABLE 7.3 Clinical trials and case studies of treatments for autism symptoms and social problems in individuals with autism spectrum disorder (ASD)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Bauminger (2002)	• $N = 15$ • 8–17 years old • 11 males diagnosed with ASD	• Open trial	• Manual • No treatment fidelity measure • Individual supervision 1–2 times/month • 3 h/week for 7 months • Involved child's main teacher, parent, and typical peer	• Behavioral observations at school • Child measure of emotion recognition, experience and understanding	• Weak	• Increased positive social behavior at school • Increase in identification and knowledge of specific emotions, including those that require perspective taking
Bauminger (2007a)	• $N = 19$ • 7–11 years old • 18 males • Diagnosed with ASD	• Open trial	• Manual • No treatment fidelity measure • Individual supervision 1–2 times/month • 3 h/week for 7 months • Involved child's main teacher, parent, and typical peer	• Teacher-report of child social skills • School observation of child social behaviors	• Weak	• Significantly higher scores on the teacher-report measure of social skills • Significant increases in positive social behavior (eye contact, sharing)
Bauminger (2007b)	• $N = 26$ • Mean age: 8 years • 24 males • Diagnosed with ASD	• Open trial	• Manual • No treatment fidelity measure • Individual supervision 1–2 times/month • 2 weekly sessions for 7 months • Teacher-led small social skills groups (typical and ASD students)	• School observation of child social behaviors	• Weak	• Group social behaviors improved within the treatment groups • Group social behaviors during observations at recess did not improve

(Continued)

Table 7.3 (Continued)

Study	Participants	Study type	Method	Primary outcome measures	Quality of study methods[a]	Outcomes
Cashin (2008)	• $N = 1$ • 13-year-old male • Diagnosed with Asperger syndrome	• Case study	• No manual • No treatment fidelity measure • Narrative therapy (unclear on number of sessions)	• Number of intense anger outbursts per month	• Weak	• Lowered intense anger outbursts to once per month
Lopata et al. (2006)	• $N = 21$ • 6–13 years old • All male • Diagnosed with ASD	• Randomized controlled trial	• Manual • No treatment fidelity measure • Summer camp: 6 h per day, 5 days per week for 6 weeks • Two groups: social skills training and social skills training with behavioral supports	• Parent- and teacher-report of behavior on three scales: social skills, adaptability, and atypicality	• Adequate	• No group differences at post-treatment • For both groups, parent and teacher behavior reports showed significant increase in the social skills domain • Parent behavior report showed a decrease in odd or unusual behavior • Teacher behavior report showed an increase in odd or unusual behavior
Lord (1996)	• $N = 1$ • 19-year-old male • Diagnosed with Autism	• Case study	• No manual • No treatment fidelity measure • CBT medication	• Number of violent outbursts and aggressive behaviors	• Weak	• Some decrease in aggressive behaviors
Wood et al. (2009a)	• $N = 19$ • 7–11 years old • 16 males • Diagnosed with ASD and an anxiety disorder	• Randomized controlled trial (wait-list control)	• Manual • Fidelity check • Weekly individual supervision • 16 sessions of 90 min • Family CBT	• Parent report of core autism symptoms	• Adequate	• Significant group difference in ASD symptoms post-treatment (lower ASD symptoms in immediate treatment group)

[a]The quality was assessed using the criteria described by Reichow et al. (2008).

(and possibly adolescent) age-group – appears to be a promising practice for addressing at least some core autism symptoms and improving social adjustment in high-functioning youths with ASD. However, the extant evidence is quite preliminary and does not yet meet the guidelines of Chambless and Hollon (1998) even for "possible efficacy" due to the research methods employed; the outcomes were not of such a large magnitude to suggest that there is no room for improvement in these treatment methods.

CBT in Autism Treatment: Future Directions

A number of conceptually derived treatment manuals have been developed for individuals with ASD that employ cognitive behavioral strategies and related mental health treatment methods. However, many questions remain. Even the most methodologically sophisticated of the clinical trials in this group of studies does not provide the level of definitive support that exists in other pediatric psychopathology treatment domains, such as anxiety disorders or conduct problems. For example, rigorous multi-site trials of CBT have been conducted for several other types of childhood disorder in which active and pill placebo control conditions have been employed, offering strong support for certain manual-based CBT treatment programs (POTS Study Group 2004; Walkup et al. 2008). The methods employed in these studies should serve as models for investigations of the most promising CBT programs for individuals with ASD.

Before initiating large clinical trials, however, further treatment refinement and pilot testing is probably advisable – particularly for CBT treatments targeting the core autism symptom domains. ASD is a clinically challenging domain of psychopathology and, given the shortcomings of seemingly pragmatic and sensible interventions such as social skills training (SST) in affecting social adjustment among school-aged youths with ASD (Rao et al. 2008), focused attention must be given to developing robust methods that overcome the generalization and maintenance problems exemplified in most research of the SST modality. Although not successful as an intervention modality itself, this body of research does constitute an important corpus that offers some cues about steps to take in developing other treatment modalities focusing on the social communication domain in ASD: it calls into question the utility of learning paradigms for group social skills that are not tailored to the individual's symptom presentation and individual differences; it suggests that the use of hypothetical scenarios and role plays may be insufficient for generalization and maintenance to occur; and it suggests that measurement strategies need both to address directly the extent of generalization and maintenance and to assess core autism symptoms with validated measurement instruments rather than only measures of nonspecific areas of social adjustment or narrow indices of social behavior in naturalistic contexts such as amount of eye contact during playground time at school.

Need for Evidence-Based Assessment of Core Autism Symptoms as Primary Clinical Outcomes

With regard to the latter point, a brief review of best practice recommendations for evidence-based assessment in behavioral clinical trials (Chambless and Hollon 1998; Reichow et al. 2008) suggests that many clinical trials focusing on the treatment of core autism symptoms are found wanting (see Chap. 14, which addresses this point in greater detail). From the perspective of evidence-based treatment and assessment, a treatment's ultimate goal is to achieve a

clinically meaningful reduction of symptoms of a disorder or clinical remission of the disorder (as defined categorically). To test the effects of an intervention on such outcomes, psychometrically reliable and valid measures administered by an independent evaluator blind to the patient's treatment condition and the study hypotheses are viewed as the gold standard.

Table 7.4 gives a sample of evidence-based assessment measures that have at least some evidence of adequate psychometric properties in the ASD youth population. Measures specific to core autism symptoms as well as psychiatric comorbidity and administered by independent evaluators as well as rated by children and parents are noted. Although not all have been administered as outcome measures in extant clinical trials in ASD, each of these measures appears to have promise for such use. There are two issues to bear in mind in considering use of these measures for clinical trials research. First, measures administered by independent evaluators (such as psychiatric interview schedules) often require specific training and certification and therefore generally add to the cost of a trial. Second, we harbor some reservations about extant child self-report measures using a paper and pencil format in ASD, including the two measures noted in Table 7.4 (i.e., the Multidimensional Anxiety Scale for Children (MASC; March 1998) and the Loneliness Rating Scale (Asher et al. 1984)), due to the cognitive demands of such measures; we believe that more effort is probably needed to refine and validate such measures in the ASD youth population.

Enhancing CBT Treatments for ASD Symptoms

In light of the contemporary principles for CBT development noted in the introduction, we offer four recommendations for enhancing the efficacy of CBT interventions in autism that could potentially build towards more robust treatment models with the capacity to reduce core autism symptoms in affected high-functioning individuals. Our experiences in developing and testing CBT treatments for children with ASD (Wood et al. 2009a, b) and other psychiatric disorders (Wood et al. 2006), as well as the panoply of evidence-based practices that are available for the treatment of a wide variety of childhood mental health conditions (Kazdin and Weisz 2003) have informed these recommendations.

As a general principle, in developing CBT treatment methods for children with ASD, target goals (e.g., social skill development and generalization) need to be matched with procedures for enhancing memory retrieval. For example, to promote reciprocal conversation skills, the encoding specificity principle from basic memory research suggests that skill learning should occur in the actual settings where conversational deficits are exhibited, rather than in simulated social situations such as therapy settings, as is often done in traditional social skills training. As a second example, research on levels of processing in human memory has demonstrated that deep semantic processing – rather than rote memorization – increases the chance of the retrieval of a target memory (e.g., for a social skill). To promote deep semantic processing of new concepts, Socratic questions (questions that incorporate hints of the correct answer) can be posed by the therapist to encourage children to put accurate answers in their own words. The combination of repeated in vivo rehearsal of social skills in real-world settings coupled with Socratic discussions about the positive effects of such skills may promote deep semantic processing and increase the memory retrieval of the targeted skills in naturalistic contexts while helping to suppress memories of habitual maladaptive responses such as social avoidance (Sze and Wood 2007, 2008; Wood et al. 2009a, b).

TABLE 7.4 Promising evidence-based assessment measures for clinical trials for individuals with autism spectrum disorder (ASD)

Measure type	Scale	Domains assessed	Acceptable psychometric properties in ASD?	Used as outcome in clinical trials?
Independent evaluator-rated measures	Autism Diagnostic Observation Schedule (ADOS) (Lord et al. 1999)	Core autism symptoms	Well established	Dawson et al. (2009)
	Autism Diagnostic Interview – Revised (ADI-R) (Lord et al. 1994)	Core autism symptoms	Well established	No
	Anxiety Disorders Interview Schedule for DSM-IV (Silverman and Albano 1996)	Comorbid psychiatric disorders	Preliminary evidence (Wood et al. 2009a, b)	Wood et al. (2009a, b)
	Children's Yale-Brown Obsessive–Compulsive Scale – Modified for Pervasive Developmental Disorders (CYBOCS-PDD) (Scahill et al. 2006)	Repetitive behaviors	Some evidence (Scahill et al. 2006)	King et al. (2009)
	Live school observational ratings	Peer social engagement and appropriateness	Yes	Bauminger (2002)
	Classroom sociometric/ social network ratings	Social acceptance	Yes (Chamberlin et al. 2007)	Frankel et al. (2007)
Child-rated scales	Multidimensional Anxiety Scale for Children (MASC; March 1998)	Anxiety	Some evidence (Bellini 2004)	Wood et al. (2009b)
	Loneliness Rating Scale (Asher et al. 1984)	Loneliness	Some evidence (Bauminger and Kasari 2000)	Bauminger (2007a)
Parent-rated scales	Social Responsiveness Scale (SRS; Constantino and Gruber 2005)	Core autism symptoms	Well established	Wood et al. (2009a)
	Child Symptom Inventory-4 (CSI-4; Gadow and Sprafkin 2002)	Comorbid psychiatric symptoms	Yes (Gadow and Sprafkin 2002)	Gadow et al. (2007)

Recommendation 1: Use Verbally Mediated Methods That Can Promote Conceptual Development and Generalization

A key critique of strictly behavioral intervention methods (e.g., operant conditioning) is that no explicit verbally mediated concept is produced by the intervention (Brewin 2006). A simple example is illustrative: A child is taught to compliment peers at school about the toys they have and the games they are playing (e.g., "Cool dinosaur!"). However, when with parents, who do not play with toys, the child has

no basis for giving compliments because no conceptual principle has been taught and no contingencies have been set up in the home environment. Arguably, if the child had developed concepts about others' perspectives, and the impact of others' perspectives on how they treat the child, the tendency of compliments to positively affect others' perspectives, and principles for adapting compliments appropriately across settings accompanied by behavioral experimentation involving "playing detective" to see if specific compliments "work" in various social situations by paying attention to changes in others' facial expression and tone of voice (a naturalistic reinforcer that also attunes children to key sources of information about others' mental states), then an appropriate adaptation of the social skill across settings could more easily be derived. Generally, the development of accurate, language-mediated concepts pertaining to various life situations that can yield adaptive behavioral (and emotional) responses is a key goal of CBT that differentiates it from purely behavioral therapies that do not promote explicit cognitive formulations (Brewin 2006).

Socratic questioning provides enough information in the question to guide individuals towards correct types of answer while still eliciting sufficient thinking and reflection to promote insight and avoid the pitfalls of superficial rote learning (e.g., immediately before entering a playground interaction: "If you offered her a turn, what is a nice thought she might have about you…? …Like, 'Bea is…?' …oh, a good friend? So she would like you being so friendly to her?") All skill development and practice efforts in CBT should be supported by guided conversations in which the therapist or caregiver uses Socratic questioning to promote conceptual development and perspective taking. The immediacy of such planning helps ensure the affected individual remembers what to say when initiating the interaction moments later, and allows therapists or caregivers to check in soon after the interaction has transpired to discuss whether the planned behavior had the intended effect (e.g., elicited friendly responses) and why it did or did not. The linkage between engaging in immediate behaviors in naturalistic contexts and deep semantic processing of the rationale should lead to enhanced memory formation and retrieval. Thus, rather than using a stimulus–response paradigm to elicit social behaviors without facilitating comprehension, as has been criticized in other intervention methods in ASD such as facilitated communication, this cognitively based approach teaches principles of social interaction through hands-on experience and verbal discussions to promote accuracy of social cognition (presupposing, as noted in Bauminger (2002), that inaccurate social cognition in ASD accounts for part of the core social deficits). High-functioning, school-age children with ASD generally have sufficient language capacity to engage in and benefit from such conversations, although visual aides (e.g., writing concepts or drawing supporting pictures), incentives, and good humor are also helpful in ensuring active participation (Sofronoff et al. 2005; Sze and Wood 2007, 2008).

Recommendation 2: Adapt the CBT Concepts of Graded Hierarchies and In vivo Exposures to Form a Core Treatment Plan Based Around Explicit, Objective Goals for Individuals with ASD

Many CBT programs for child anxiety disorders use graded hierarchies as the basis of the treatment plan (Kendall 1994). Traditionally, such hierarchies have focused on feared situations and involve small incremental steps that guide children towards proficiency in new target behaviors. A hierarchy for a specific phobia might be getting close to a phobic object and observing it until anxiety is low and touching or holding the phobic object until anxiety recedes.

Directly facing feared situations in this manner is known as "in vivo exposure." Hierarchies for more complex anxiety disorders (e.g., separation anxiety disorder) may have 20 or more steps spanning multiple situations and exposures. Although hierarchies are naturally useful in organizing classical conditioning procedures in the treatment of anxiety, we have found that incorporating non-anxiety-related goals, such as friendship building, self-help skills acquisition, and compliance with caregivers, into the hierarchy effectively organizes all target behaviors into a single, integrated treatment plan for schoolchildren with ASD (Wood et al. 2009a, b).

Core ASD symptoms and comorbid problems may be organized, sequenced, and prioritized via the hierarchy. In hierarchy-based treatment plans in CBT, ultimate goals are set forth in behavioral and observable terms (e.g., engage in appropriate peer play 100% of the time during recess), which permits the delineation of specific tasks that the child can engage in to build up to ultimate goals (e.g., "play handball each day at recess for 5 min while keeping hands and feet to self" – an early task building up to consistent appropriate social participation during unstructured playtime). The transformation of ultimate goals into a series of increasingly challenging behavioral tasks is an important therapeutic technique that is similar to task analysis, helping individuals learn components of a skill sequentially, and slowly develop tolerance for activities that may initially be frustrating. Such learning procedures enhance long-term retention and mastery (Brewin 2006). The hierarchy-based approach does not assume that a set amount of therapeutic time will be sufficient for improvement of a specific problem area but rather sets specific goals that *should* be achieved by an individual prior to therapy termination (hence, calling for an individualized treatment approach that responds to the individual's progress from session to session).

Hierarchy goals focus primarily on behaviors outside the therapy room, with an emphasis on selecting situations where dysfunction actually manifests – such as school – to promote generalization (Bauminger 2002). For example, rather than merely focusing on the patient's ability to pose conversational questions to the therapist in a session (as part of the ultimate goal of achieving appropriate reciprocal social interactions), such questions would be practiced in a wide variety of social settings with different partners (e.g., with familiar and novel peers and staff at school, at playgrounds, in the waiting room, etc.) to promote generalization. A combination of cognitive and behavioral strategies as well as parent and teacher support are needed to achieve success with such assignments.

During hierarchy development, goals and steps (often entailing in vivo exposures) are refined and rated (methods for hierarchy development are discussed in detail elsewhere; e.g., see the work of Wood and McLeod (2008)). *Difficulty ratings* are an important feature of CBT rarely employed in other therapeutic paradigms; using a scale (e.g., 0–10), each subgoal is rated by the patient (and parent, as appropriate) in terms of "how hard would it be to do" or "how anxious would it make you?" These ratings help guide the ordering of therapeutic tasks in terms of what to address first. Knowledge of the perceived difficulty of the planned behavioral tasks can be the difference between making slow, steady progress and stalling permanently on a step that the patient is not ready to take.

CBT usually begins with fairly easy tasks from the hierarchy to ensure early success. Over the arc of treatment, the affected individual addresses goals and exposure tasks at an increasingly challenging level of difficulty until target skills are mastered. The leverage and motivation provided by the reward system (see Recommendation 4), carefully nurtured rapport with the therapist (e.g., as maintained by using special

interests as examples and metaphors, as in the work of Sze and Wood (2007, 2008)), and activation of the individual's pride through success and praise generally drive progress during hierarchy-based tasks.

Recommendation 3: Social Skills Can Be Developed by Individuals with ASD but Are Most Likely to Be Generalized and Maintained through In vivo Exposure

Core ASD deficits in both verbal (e.g., off-topic responding and one-sided conversations) and nonverbal (e.g., poor body boundaries and poor eye contact) aspects of communication often underlie poor peer relationships among individuals with ASD (Barnhill et al. 2002). Traditional social skills training for youths with ASD often focuses on learning new skills in hypothetical situations by interacting with children or adult collaborators in a therapy room (e.g., "imagine a child steps on your toe while you are in the lunch line ..."). The encoding specificity principle in cognitive science suggests that treatment must go beyond these hypothetical situations and emphasizes practicing new social skills in the actual settings where problems are experienced. In CBT, appropriate social skills (e.g., positive entry behavior) and coping skills (e.g., relaxation and suppression of urges to act inappropriately) can be practiced in small steps in such settings and expanded until mastery is achieved. Hence, generalization and maintenance of social skills are naturally programmed into in vivo exposures.

One method for promoting successful in vivo social exposures is parent-training on social coaching, a technique used to provide children with information about social situations and etiquette that can lead to positive, reinforcing social experiences (Sze and Wood 2008; Wood et al. 2009a). In social coaching, caregivers (parents, aides or teachers) prompt the child to engage in specific social behaviors (verbal and nonverbal) immediately preceding actual social interactions (i.e., moments before, rather than hours or days before). Rather than a purely behavioral (priming) technique, Socratic questioning is used before and after each interaction, as noted above (i.e., incorporating the child in the formation of each social plan and challenging him or her each time to think through the "why" question – "why would these behaviors be useful?").

In social coaching, social behaviors are taught by reinforcing a series of successive approximations of specific conversational skills under real-world conditions, allowing for encoding specificity (that is, increasing the chance a target behavior will be recalled and reproduced in the future by teaching it in environments where it is desirable to use (Brewin 2006) and natural reinforcement (i.e., from positive peer and other responses). Initial target social behaviors can include basic greetings, farewells, and compliments. For example, a parent might coach her daughter to greet various family members appropriately upon their homecoming each day. This can then be expanded to a variety of other settings where social interactions occur (e.g., interactions with family friends and playdates with peers). Once initial elements of conversations are mastered, social coaching can be used to help children carry on longer appropriate conversations by prompting them to use specific skills after the initial greetings, such as relevant questions about the partner's interests (sometimes referred to as "playing detective" (Frankel and Myatt 2003)) and "me-too" disclosures in response to the partner's conversational topics that show social commonality and maintain focus on the topic. One-on-one aides and other school professionals who have ready access to the child's social situations can be trained in social coaching as well (Wood et al. 2009a). Although caregivers primarily deliver this intervention, a therapist can develop the initial set of social tasks and the social coaching procedure with the

child in settings such as parks, playgrounds, and at recess. After the child and therapist have developed a comfortable routine, parents and relevant school caregivers can be included in these sessions for the purpose of modeling and transfer of control (in which the therapist has the caregiver take over the therapist's role and receive feedback and coaching from the therapist as needed). One critical social situation that caregivers ultimately must support effectively is playdate-hosting, an activity that, with corresponding Socratic discussions, has the potential to enhance perspective taking and reciprocity.

This intervention approach can be seamlessly and naturally incorporated into families' daily routines and carried out in high doses indefinitely for little or no cost. Research on young children with autism suggests that high-dosage, long-term behavioral interventions (Koegel et al. 2003; Lovaas and Smith 2003) are often necessary for large improvements. Although high-functioning, school-age children are often less clinically impaired than the younger participants in studies of early, intensive behavioral interventions, they are still treatment-resistant (Rao et al. 2008) and likely need a high dose of social intervention to move them towards typicality. In short, using CBT for the development of social skills is likely to be effective if hierarchical in vivo exposure is emphasized, appropriate preparations are made to help the child develop skills to handle specific in vivo social tasks and gain increasingly sophisticated schemas of social situations, and a high-dose, caregiver-mediated approach is taken.

Recommendation 4: Use a Comprehensive Reward or Incentive System Throughout CBT, Employing the Most Motivating Reinforcers Available

Deficits in children's motivation related to ASD (Koegel and Egel 1979; Koegel and Mentis 1985) necessitate a comprehensive reward or incentive program, a core element of efficacious treatments for ASD and disruptive behavior disorders (Webster-Stratton and Reid 2003). Specific tasks and goals delineated in the hierarchy (see Recommendation 2) can provide target behaviors to include on the rewards chart each week (e.g., "Each day, call a student from class and ask for the homework assignment politely – 1 point"). Our experience suggests that between three and five daily target behaviors can be on the rewards chart at any given time, including school-related behaviors (more than five simultaneous goals is confusing for most children and, hence, counterproductive) (see Wood and McLeod 2008). When highly desired activities are leveraged through such a system, children are more likely to engage fully in therapeutic tasks and homework, greatly assisting in CBT progress (Sze and Wood 2007, 2008). In contrast with typical applied behavior analysis principles, which advocate a gradually increasing use of contingency management, we have found that for most school-aged youths with ASD in our clinical trials beginning the program by making key motivating privileges, activities, and items (e.g., access to electronics or materials related to special interests (Attwood 2003)) contingent on the child's successful completion of daily therapeutic goals is a much more efficient and unambiguous method that often propels early progress in therapy and, subjectively, appears to enhance treatment expectancies and optimism in most family members at the critical early alliance formation period of CBT (Chiu et al. 2009). In sum, these procedures are an indispensable core "behavioral" method in CBT for children. When used to encourage children to learn skills (e.g., prosocial communication) we have found that there is rarely a need to continue such extrinsic motivators indefinitely – just until the skills have been mastered and have become intrinsically motivating (i.e., by yielding natural positive

consequences such as enjoyable peer interactions). This is potentially evidenced by the maintenance of treatment effects on core ASD symptoms in the pilot RCT by Wood et al. (2009a) showing that social responsiveness scores were maintained or improved 3 months after treatment was terminated.

Conclusion

A number of promising CBT intervention programs have been developed for school-aged children, adolescents, and, to a lesser extent, adults with high-functioning autism spectrum disorders. In no case is the evidence base definitive in its support of these programs at present, in no small part due to the methodological limitations of the existing studies (e.g., small sample sizes, lack of random assignment, no evidence of treatment fidelity, failure to use evidence-based, diagnostic measures of ASD symptoms and failure to use diagnoses as primary outcome measures). This is not necessarily reflective of the weakness of the programs themselves but it leaves questions about the efficacy and strength of effects unanswered at the present time. Some clues about the clinical significance of the interventions can be attained by calculating effect sizes from the available data and, interestingly, effects ranged from small to large depending on the study and outcome measure in question. While potentially encouraging, effect sizes generated from studies with methodological weaknesses cannot be treated as definitive. In short, many of the programs reviewed above show potential merit for addressing autism and its comorbidities but require further evaluation to determine the breadth and depth of clinical efficacy in this treatment-resistant population. In the meantime, practitioners would be encouraged to adopt practices from this body of research that show evidence of strong effects in studies using more robust research designs.

Because of the inherent difficulties in the treatment of individuals with ASD and the history of limited success in theoretically derived interventions for affected school-aged youths and adults (Rao et al. 2008), clinicians in research and practice settings are encouraged to further develop the CBT intervention practices tested in the extant clinical trials reviewed in this chapter. Incorporating principles of learning and memory retrieval from contemporary cognitive science, as well as from research in autism (Bauminger 2002), offers a key avenue for the refinement and expansion of current CBT treatment methods. Devising robust methods for promoting the understanding and encoding of social concepts so that therapeutically induced memories are retrieved in novel situations that challenge individuals with autism, rather than the habitual maladaptive social responses that characterize this spectrum of disorders, will require ongoing treatment development efforts, careful pilot testing, and above all else, clinical imagination.

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