CBT and Autism Spectrum Disorders: A Comprehensive Literature Review

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Abstract

The overall intention of this project was to enhance awareness, for those involved with persons on the autism spectrum, of cognitive behaviour therapy (CBT) strategies for treating persons with autism spectrum disorders (ASD). The project involved a literature review on autism and the use of CBT strategies for people with autism spectrum disorders (ASD). The literature review attempted to answer the question: *Is there sufficient evidence to conclude, based on the research reviewed, that CBT for children with ASD is an efficacious or probably efficacious treatment?* This projected is intended to be a valuable resource to parents, professionals, counselors, educators and others in close contact with persons on the spectrum. Overall, the evidence reviewed suggested that CBT delivered in a flexible manner individualized to the ASD child can be effective in reducing symptoms of anxiety and may also have an impact on some of the core features of ASD such as social cognition. The research suggested that CBT can be a very powerful and effective tool for higher-functioning children on the autism spectrum, and may be considered an empirically validated efficacious therapy for this population. Strengths and limitations of this project are addressed, and comprehensive appendices as well as an extensive reference list are included.

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Table of Contents

CBT and Autism: A Literature Review

Chapter 1: Overview and Introduction

This project is a literature review on cognitive behavior therapy (CBT) interventions for persons on the autism spectrum. Chapter 1 gives an overview and introduction to the project. Chapter 2 describes autism spectrum disorder (ASD), its diagnosis, prevalence, overlap with other conditions, long-term outcomes, and introduces interventions. Chapter 3 critically examines the available research on using CBT interventions in autism spectrum disorders. The research review attempts to answer the question: *Is there sufficient evidence to conclude, based on the research reviewed, that CBT for children with ASD is an efficacious or probably efficacious treatment?* The American Psychological Association Division 12 Task Force on Promotion and Dissemination of Psychological Procedures (APA, 1993) has developed criteria for establishing empirically supported treatments.

The Task Force criteria included at least two randomized between group design studies (or a series of case studies); replication by independent research teams; comparison to placebo condition or other treatment; well-documented, replicable procedures or treatment manual; and clearly defined population and presenting problem (APA, 1993; Chambless & Hollon, 1998). The task force also recommended that researchers provide evidence of therapist training and treatment adherence; use multimethod outcome assessment; and assess long-term outcomes. Treatments meeting most of these criteria may be described as *probably efficacious*.

Chapter 4 describes the methods used in completing the project such as the literature search strategy, the databases searched, and the key terms used. Chapter 5 summarizes the work reviewed, highlights the strengths and limitations of the project, and suggests some future directions.

The rationale for producing this project was two-fold. The first reason was to provide those involved with persons on the autism spectrum with information, based on the research, regarding CBT strategies for intervention. In my involvement at a local community autism centre, I am frequently approached by teachers, teaching aides, group homes, support workers, parents, mental health professionals, and counsellors looking for strategies to deal with difficult behaviors in persons with ASD. This project provides information, based on the current research, on potential CBT strategies for use with persons on the autism spectrum.

The second reason for producing this project was to enhance awareness of those involved with persons on the autism spectrum of CBT as a potential intervention option for use with people with ASD. It has been my experience that most people that I have come in contact with (such as professionals and laypersons) in the province of New Brunswick and across Canada are relatively unaware of the research supporting the successful use of CBT with ASD. This literature review provides its readers with the opportunity to become more aware of the research on using CBT for those with ASD. It is my further hope that increased knowledge and education in this area can lead to the development of more effective tools to address the issues commonly associated with ASD, and help parents and others become better-informed advocates for their children.

Chapter 2: Autism Spectrum Disorder

In discussing treatment for a condition, it is important to first define the condition. This chapter describes autism spectrum disorder (ASD), its diagnosis, prevalence, overlap with other conditions, long-term outcomes, and introduces interventions.

Diagnosis

Autism falls under the DSM-IV-TR (American Psychiatric Association, 2000) classification umbrella of pervasive development disorders (PDD). The term PDD is a generic term used in the DSM-IV-TR to describe a group of disorders consisting of autism, Asperger syndrome (AS), childhood disintegrative disorder (CDD), Rett's disorder, and pervasive development disorders not otherwise specified (PDDNOS). This project will focus on autism, AS and PDDNOS. These three subgroups are collectively referred to as autism spectrum disorders or ASD (Fombonne, n.d.; Szatmari, 2000). According to the DSM-IV-TR, autism is a neurological disorder that is traditionally defined in terms of a triad of behaviorally based impairments.

Although there is great heterogeneity in individual expression, persons with autism and related disorders typically all demonstrate some degree of impairment in communication and social interaction and engage in repetitive, stereotypical behaviors (APA, 2000; Singhania, 2005; Woodbury-Smith & Volkmar, 2008). For example, difficulties in ASD may include impairments in important aspects of communication such as difficulties in turn-taking, taking another's perspective, interpreting nonliteral language, understanding and expressing emotions, maintaining eye contact, initiating

conversations, and a tendency to dwell on certain topics (Beaumont & Sofronoff, 2008; Weiss & Harris, 2001; White, Koenig, & Scahill, 2007). These deficits do not usually improve with age and impairment may increase as children reach adolescents and their social environment becomes more complex (Krasny, Williams, Provencal, & Ozonoff, 2003; Weiss & Harris; White et al.). Some of the direct and indirect consequences of these social and communication deficits may include an increased risk of peer rejection and social isolation, academic and occupational underachievement, and mood and anxiety problems (Elder, Caterino, Shacknai, & Simone, 2006; Krasny et al.; White et al.). Therefore addressing the social and communication difficulties of a person with ASD may be essential components of therapy (Bellini, 2004; Gaus, 2007).

Prevalence

Autism spectrum disorders are found to affect four to five times as many males as females in countries across the world (Fombonne, 2003; Fombonne, 2005b). Current prevalence studies suggest a frequency rate as high as 60/10,000, or 1 child in 165 is affected with PDD, (Fombonne, 2003; Fombonne, 2005b; Fombonne, n.d.). Of these, classic autism is thought to account for about 10 to12 cases per 10,000 (Tidmarsh & Volkmar, 2003). Epidemiological studies of AS are rare (APA, 2000; Fombonne, 2003: Fombonne, 2005a) although AS has been found to be as high as 26-36 cases per 10,000 in a population study of 7-year olds in the city of Karlstad, Sweden (Kadesjo, Gillberg, & Hagberg, 1999). Pervasive development disorder not otherwise specified may account for up to 24 cases per 10,000 (Fombonne, 2005b). In Canada there are estimated to be as

many as 48,000 children (up to 19 years of age) with ASD based on 2001 Census data (Fombonne, n.d.).

A large percentage of individuals across the PDD spectrum have mental retardation (Fombonne, 2003), but this rate differs greatly by subtype. About 80% of people with classic autism show some degree of cognitive impairment (Gillberg & Billstedt, 2000) while those with Asperger syndrome (by definition) rarely present with IQs lower than 70 on standard tests of intelligence (Fombonne, 1999; Fombonne, 2005b). Fombonne (2005b) suggests that about 12% of PDDNOS cases have some degree of mental retardation.

Co-Existing Conditions

A large percentage of those with ASD have coexisting medical conditions or psychiatric problems (APA, 2000). These can include epilepsy, tuberous sclerosis, attention deficit/hyperactivity disorder (both hyper- and/or hypo-active), motor control disorders (such as Tourettes syndrome or tics), abnormal sleep patterns, eating disorders, aggression, sensory impairment, obsessive-compulsive behaviors, and depression (APA, 2000; Gillberg & Billstedt, 2000; Matson & Nebel-Schwalm, 2006; Woodbury-Smith & Volkmar, 2008). The research also indicates that a large percentage of people with AS and high functioning autism (HFA) suffer from significant levels of comorbid anxiety (e.g., Gillott, Furniss, & Walter, 2001; Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Mcneil, Lopes, & Minnes, 2008; Russell & Sofronoff, 2005; Weisbrot, Gadow, DeVincent, & Pomeroy, 2005). The particular symptoms and levels may vary with age (Ghaziuddin, Weidmer-Mikhail, & Ghaziuddin, 1998; Weisbrot et al.) or PDD subtype

(Muris, Steerneman, Merkelbach, Holdrinet, & Meesters, 1998; Russell & Sofronoff; Tonge, Brereton, Gray & Enfield, 1999; Weisbrot et al.). Levels of anxiety in persons with AS or HFA seem to be higher than the general population (Gillott et al.; Kim et al.; Russell & Sofronoff; Sofronoff, Attwood, & Hinton, 2005; Weisbrot et al.). Aggressive, disruptive, anti-social, oppositional or obsessive compulsive behaviors, which are frequently reported in children on the spectrum, may be closely related to the PDD child also experiencing anxiety and mood problems (Kim et al.; Tonge et al.). Comorbidity is hypothesized as one factor contributing to the poor outcomes often found in this population (Kim et al.).

Outcomes

Lainhart and Folstein (1994), in an outcomes review of 17 published case studies of people diagnosed with PDD, found that anxiety is a very important factor to consider early in treatment. They noted, “several reports mentioned that before specific treatment, behavioral symptoms associated with the affective disorder threatened the patient’s placement in the home, at school, and in the workplace” (p. 595). Once the affective disorder was specifically treated (in these cases, pharmacologically) there was improvement in affective symptoms, as well as significant improvement in autistic features and ability to function. Personal accounts such as those from Temple Grandin (1995) and Dawn Prince-Hughes (2004), who found effective treatment for their anxiety through medication and other methods, support the argument that coexisting disorders represent an additional impairment that should and can be treated in persons with ASD. Unfortunately, anxiety and depression often remain undiagnosed as separate conditions in

children with ASD, and therefore are left unaddressed in treatment (Bryson, 1996; Bryson & Smith, 1998; Gillberg & Billstedt, 2000; McNeil, et al., 2008; Tantam, 2000) possibly contributing to the poor outcomes generally found in this population (Kim et al., 2000).

Another reason to focus treatment on anxiety is that outcome studies have noted that a large percentage of persons diagnosed with ASD required substantial care and assistance into adulthood (Eaves & Ho, 2008; Green, Gilchrist, Burton, & Cox, 2000; for a review see Howlin, 2000; Howlin, Goode, Hutton, & Rutter, 2004). Bryson and Smith (1998) argued that better diagnosis and treatment of comorbid disturbances (such as anxiety and depression) within this population may lead to more positive long-term outcomes.

Treatment

Historically, difficulties in autism were addressed using behavior modification strategies (McConnell, 2002; Steerneman, Jackson, Pelzer & Muris, 1996; Weiss & Harris, 2001; Winner, 2008). These early efforts in applied behavior analysis (ABA) involved teaching children discrete social skills, such as making eye contact, making simple requests, exchanging hugs, and initiating conversations (Weiss & Harris; White et al., 2007; Winner, 2008), with most of the research being done with young children. According to behavior modification theory, behavior is a function of its consequences, and that by changing the consequences one can alter the behavior (Wilson, 2005). Although research has demonstrated the efficacy of reinforcement, punishment, extinction, stimulus control and other behavioral procedures, modern behavioral

strategies for children most often use reinforcement in the form of direct rewards contingent on the performance of specified target behaviors (Winner, 2007d). ABA can be highly effective at temporarily changing behaviors, but it is important to note that gains using these methods have generally not been maintained across settings or over time (Bellini, Peters, Benner, Hopf, 2007; Elder, et al., 2006; Krasny, et al., 2003; White, et al., 2007). I believe that the limited success of these interventions may be due in part to not addressing affect or cognitions as part of the treatment regime. CBT is a more recent addition to the treatment repertoire for addressing deficits in ASD that explicitly addresses cognitions and affect.

As previously noted, persons on the spectrum frequently present with challenging behaviors and are at increased risk for comorbid psychopathology (Matson & Dempsey, 2008). These issues are commonly addressed by pharmacotherapy (Matson & Dempsey). Some researchers (e.g., Kim et al., 2000; Matson & Dempsey) however, recommend caution in using pharmacotherapy and warn that over-medication of children with PDD is already a serious problem. They argue that there is a need for more randomized controlled trials to determine the benefits of pharmacotherapy in this population.

The provision of appropriately structured environments and educational programs is considered to be one of the most important aspects of successful treatment (Bryson & Smith, 1998; Howlin, 1998; NRC, 2001). According to Bryson and Smith (1998), one unequivocal finding in the research is that providing environments suited to the needs of people with autism improves outcomes. They go on to say, “in such environments, other people understand the impairments associated with autism and are well versed in

'proven' autism-specific methods for enhancing the development of life skills and personal happiness" (p.100). This seems to advocate a psychoeducational/preventative approach to intervention.

Researchers are beginning to demonstrate the effectiveness of using cognitive behavioral strategies to address some of the issues faced by persons on the autism spectrum such as anxiety and anger management, as well as social functioning (e.g., Gutstein, Burgess, & Montfort, 2007; Reaven & Hepburn, 2003; Sofronoff, et al., 2005; Sofronoff, Attwood, Hinton, & Levin, 2007; Sze & Wood, 2008). Cognitive behavior therapy is based on the assumption that psychological functioning involves a reciprocal interaction between behavior, cognitive processes, affect, and environmental factors. CBT is not just one technique but actually consists of a variety of interventions administered in a flexible manner individualized to the specific client and his or her presenting issues (Gaus, 2007; Gosch, Flannery-Schroeder, Mauro, & Compton, 2006). Specifically CBT interventions may include, but are not limited to, providing education on the nature of the client issue, recognizing somatic responses, teaching relaxation techniques, identifying negative thoughts and feelings and learning to challenge them, teaching problem-solving skills, modeling, role-playing, and in vivo practice of new skills (Bernstein et al. 1997; Velting, Setzer, & Albano, 2004). Based on the research, CBT is considered to be an *efficacious* treatment for a number of childhood issues including anxiety, depression, and oppositional and aggressive behavior (Compton, et al., 2004; Kazdin & Weisz, 1998; Southam-Gerow & Kendall, 2000), according to the

criteria for empirically supported treatments set out by the APA Division 12 Task Force on Promotion and Dissemination of Psychological Procedures (APA, 1993).

Summary

There are significant numbers of persons diagnosed with autism spectrum disorders each year (Fombonne, 2003; Fombonne, 2005b; Fombonne, n.d.). Although there is great heterogeneity in expression, individuals diagnosed with ASD all show some degree of impairment in functioning (APA, 2000). Many have co-existing medical and mental health issues (APA, 2000). It has been hypothesized that the poor outcomes generally found with this population, may be due in part to unrecognized and untreated comorbid conditions such as anxiety and depression (Bryson & Smith, 1998; Kim et al., 2000). Historically, treatment methods for people on the spectrum have included behavior modification strategies, pharmacotherapy, structured environments, and educational programs, but none of these specifically address cognition or affect. CBT is a treatment strategy that addresses both affect and cognitions. The following chapter will examine the research on the use of CBT for those on the autism spectrum.

Chapter 3: Autism and CBT

This chapter examines the available research on using CBT interventions with persons on the autism spectrum with particular attention paid to the criteria for efficacious or probably efficacious treatments described in Chapter 1 (APA, 1993; Chambless & Hollon, 1998). The search strategies used for this literature review are described in Chapter 4.

This self-authored search resulted in 15 peer-reviewed empirically based research articles specifically examining CBT in treating those on the autism spectrum (see Appendix A for a list). The results will be categorized and presented in this chapter.

Of interest, eight of the articles in this review used CBT methods to treat anxiety; six articles used CBT to address social functioning, and one article targeted anger management using a CBT intervention. Appendices B through L summarize these 15 studies based on sample characteristics, outcome measures, treatment design and delivery variables, and findings.

Although all the treatment studies reported positive outcomes, the outcomes of these studies are presented last as it was felt it was important to first critically examine the quality of the research, compared to the Task Force criteria (APA, 1993). Consequently, this chapter discusses sample characteristics, diagnostic criteria, outcomes measures, research design, treatment descriptions, and lastly, outcomes.

Sample Characteristics

Sample size and age. All of the research studies reviewed (n =15) used high functioning children on the autism spectrum. See Appendix B for more details on age, gender, IQ levels, and numbers of children involved in each study. Five of the anxiety studies were single-subject case studies (i.e., Cardaciotto & Hebert, 2004; Lehmkuhl, Storch, Bodfish, & Gefken, 2008; Reaven & Hepburn, 2003; Sze & Wood, 2007; 2008). Of these case studies, one used a 23 year-old male with AS (Cardaciotto & Hebert), while the others reported on children between 7 to 12 years of age with either high functioning autism (HFA) or AS. The Ooi et al. (2008) study treated a group of six male children with ASD or AS who were between 9 and 13 years of age. Chalfant, Rapee, and Carroll (2007) reported on a group of 47 children with ASD or AS who ranged in age from 8 to 13. Sofronoff, Attwood, and Hinton (2005) examined 71 children with AS, between the ages of 10 and 12.

All of the social functioning studies involved small groups of children. Of these, Bauminger (2002) looked at 15 HFA children between 8 to 17 years of age. Bauminger (2007a) treated 19 HFA children who ranged in age from 7.5 to 11.5. The children in the follow-up study a year later involved many of the same children (Bauminger, 2007b) who would then be between 8.5 to 12.5 years of age. Beamont and Sofronoff (2008) also used a group of 49 children with AS, in this age range (7.5 to 11 years). Crooke, Hendrix and Rachman (2007) treated six children with AS or HFA, who were between 9 and 11 years of age. Sofronoff et al. (2007) looked at anger management in 45 AS youth who were from 10 to 14 years old. The Gutstein et al. (2007) study was unique in looking at 16 very

young children with autism, AS, or PDDNOS, ranging in age from 20 to 96 months at the time of initiating treatment, and results were measured after a relatively long (30 months) treatment duration.

These relatively small sample sizes and limited age ranges make it difficult to generalize the results to the entire population of those with ASD or even to the subpopulations of HFA or AS. Nevertheless, in terms of criteria for empirically supported treatment (Chambless & Hollon, 1998), the population being studied (ASD diagnosis) was clearly defined (see Appendix C). The presenting problems of anger, anxiety, and social functioning were also clearly defined in each study (see Appendix C). These are explored in more detail in the following paragraphs.

ASD diagnosis. Best practice guidelines for the diagnosis of ASD recommend a comprehensive assessment by qualified professionals, using a combination of parent report and observation, based on DSM-IV criteria (Perry & Condillac, 2003). Generally diagnosis would also involve use of a standardized autism observation measure (Perry & Condillac). The Autism Diagnostic Observation Schedule (ADOS), the Childhood Autism Rating Scale (CARS) and the Autism Diagnostic Interview-Revised (ADI-R) are the most commonly used standardized diagnostic instruments for ASD (Perry & Condillac). The reader is reminded that the diagnostic instruments and criteria used to diagnose ASD in each study are summarized in Appendix C. The reader is referred back to the studies in question for more information on and references for the various measures. Most of the studies reviewed used DSM-IV criteria, with exception of the Chalfant et al. (2007) study - which did not report the specific diagnostic criteria used,

but a qualified professional made the diagnosis. Several studies used additional standardized instruments to confirm the DSM-IV diagnosis. For example, Cardaciotto and Herbert (2004) confirmed the diagnosis using the Asperger Syndrome Diagnostic Interview (ASDI). The ADI-R was used by Reaven and Hepburn (2003), Bauminger (2002; 2007a; 2007b), Crooke et al. (2007), and Gutstein et al. (2007). Sofronoff et al. (2005; 2007) and Beaumont and Sofronoff (2008) used the Childhood Asperger Syndrome Test (CAST) to confirm the diagnosis. The ADOS was used in the Crooke et al., Gutstein et al., and the Sze and Wood (2007) studies.

Anxiety symptoms. Anxiety symptoms were also well documented in most of the anxiety studies reviewed. Structured, and or semi-structured diagnostic interviews are commonly used to make a formal anxiety diagnosis, with the Anxiety Disorders Interview Schedule for DSM-IV (ADIS) being one of the most commonly used measures (Velting et al., 2004). Appendix C provides more information on the specific problem being addressed and how it was measured in each study. The reader is referred back to the studies in question for more information on and references for the various measures. In the anxiety studies reviewed, three (Chalfant et al., 2007; Sze & Wood, 2007; 2008) diagnosed anxiety disorders in their samples based on the ADIS. Lehmkuhl et al. (2008) used DSM-IV-TR criteria, as well as describing some of the child's OCD symptoms in detail. Reaven and Hepburn (2003) described the child's obsessive-compulsive symptoms, and in addition, administered the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) to rate the severity and pervasiveness of the symptoms. Cardaciotto and Herbert (2004) used the Structured Clinical Interview for DSM-IV

(SCID-IV) to make the diagnosis of SAD. The SCID-IV is a structured clinical interview designed specifically to assess DSM-IV disorders in adults. In contrast, in the Oii et al. (2004) study, children were identified by the school psychologist as having "issues related to anxiety" (p. 216), without any indication of how these were determined, or their level of severity. In the Sofronoff (2005) study, the presence of anxiety symptoms in children was accepted based on parent report via a brief phone interview. In both of these last two studies, however, the outcome measures given at pre-treatment included an anxiety measure, giving an indication of pre-treatment levels of anxiety.

Treatment Outcome Measures

Using a variety of instruments, it is important to obtain information not only from the child, but also from other significant people in the adolescent's life, as children often under-report symptoms (Bernstein, Borchardt, & Perwein, 1996; Schniering, Hudson, & Rapee, 2000; Velting, et al., 2004). It is also important to situate this information in context, as some disorders such as anxiety, often appear together, or as part of a broad array of symptoms and behaviors (Schniering et al.). In addition, the criteria on defining empirically supported therapies, calls for assessing the effect of treatment not only on specific symptoms, but also "on more general measures of functioning and quality of life" (Chambless & Hollon, 1998, p. 10). For a useful comparison of outcome measures used in the studies reviewed, the reader is referred to Appendix D. The reader is referred back to the studies in question for more information on and references for the various outcome measures. Each of the anxiety studies reviewed, met the criteria of using multiple standardized outcome measures with information obtained from multiple

sources, and most reported effects of treatment on symptoms, as well as on broader areas of functioning (see the *Overall Results* section). In contrast, many of the social functioning studies used outcome measures designed specifically for the study. Some of the most commonly used outcomes measures will be introduced briefly in the next section.

Outcome measures in the anxiety studies. The most commonly used outcome measures in the anxiety studies reviewed were the Spence Children's Anxiety Scale (SCAS), and the Anxiety Disorders Interview Schedule for DSM-IV (ADIS). The ADIS "evaluates the presence and severity of anxiety, mood, and externalizing disorders, as well as screen for learning and developmental disorders, substance abuse, eating disorders, psychotic symptoms, and somatoform disorders" (Velting et al., 2004, p. 45). This tool gives an impairment rating for each anxiety disorder, allowing clinicians to prioritize and treat the disorder that is causing the most distress and impairment. It has also been shown to be sensitive to treatment effects (Velting, et al.).

The SCAS (Spence, 1998) measures children's anxiety on six subscales, including separation anxiety, social phobia, obsessive-compulsive disorder, panic-agoraphobia, generalized anxiety, and fears of physical injury. The SCAS has been used to examine and compare anxiety symptoms in children with PDD to normal, clinically anxious and speech impaired samples of children (e.g., Gillott et al., 2001; Russell & Sofronoff, 2005). Both the SCAS and the ADIS are considered to have good psychometric qualities (Spence, 1998, Spence, Barrett, Turner, 2003; Silverman & Rabian, 1995; Velting, et al., 2004).

The SCAS parent and child version were administered in the Chalfant et al. (2007), the Oii et al. (2008), and Sofronoff et al. (2005) studies. The Chalfant et al., and the Sze and Wood (2007; 2008) studies, used the ADIS parent and child scales.

Two studies (Lehmkuhl et al., 2008; Reaven & Hepburn, 2003) used the CY-BOCS with both the parent and child, to rate the severity and pervasiveness of anxiety symptoms. The CY-BOCS has been shown to be a valid and reliable measure of childhood obsessions and compulsions (Storch, et al., 2004). This scale has recently been modified specifically to assess symptoms in children with PDD (Scahill, et al., 2006).

According to the anxiety literature (Bernstein et al., 1997), other common standardized self-report scales for children include the Multidimensional Anxiety Scale for Children (MASC), and the Revised Children's Manifest Anxiety Scale (RCMAS). The MASC (used by Sze & Wood, 2008) assesses four factors: physical symptoms, social anxiety, harm avoidance, and separation anxiety (March, Parker, Sullivan, Stallings, & Connors, 1997). The MASC has shown robust psychometric properties (March, et al., 1997; Velting, et al., 2004). The RCMAS (used by Chalfant et al., 2007) produces three anxiety factors: physiological symptoms, worry and oversensitivity, and social concerns/concentration. It is well documented as having good reliability and validity (Gerard & Reynolds, 1999).

The reader is reminded that they should refer to the studies in question for more information on, and references for, the remaining outcome measures. Appendix D provides a convenient list of the outcome measures used in each study. Some of the other outcome measures used in the anxiety studies reviewed included the Strengths and

Difficulties Questionnaire (SDQ) completed by both parents and teachers (in Chalfant et al., 2007). This scale provides information on child difficulties in home and school contexts. The Clinical Global Impression (CGI) scales were completed by the clinicians (in Cardaciotto & Herbert, 2004 and Sze & Wood, 2008). The CGI scales provide an indication of severity of symptoms. The Social Anxiety Scale (LSAS) is a self-report measuring fear and avoidance of social situations. The Social Phobia and Anxiety Inventory (SPAI) assesses somatic, cognitive, affective, and behavioral symptoms of anxiety. LSAS and SPAI were both used in Cardaciotto and Herbert. The Children's Automatic Thoughts Scale (CATS) assessed negative self-statements and was used in the Chalfant et al. study. In the Oii et al. study, the Parent Stress Index (PSI) was used to measure stress within the parent-child relationship. The Asian Children Anxiety Scale (ACAS) Caretaker version assessed child's level of anxiety, and the Index of Teaching Stress (ITS) assessing the level of teacher distress, were also used in the Oii study. Sofronoff and her colleagues used the SWQ to get an indication from the parent of the level of social worry experienced by the child, and also used James and the Maths Test to determine the child's ability to generate coping strategies in anxious situations. In addition, a variety of other outcome measures were used in the studies reviewed, including behavioral assessment of skills, child self-generated ratings, and reports of adaptive functioning (by Cardaciotto & Herbert; Reaven & Hepburn; Sze & Wood, 2007; 2008).

Outcome measures in the social functioning studies. Assessing the effects of treatment on real-world, broader areas of functioning, in addition to treatment effects on

specific symptoms, is considered an important criterion in designing empirically-supported therapies (Chambless & Hollon, 1998; Kazdin & Weisz, 1998). The social functioning studies, by definition, assessed treatment effects on several areas of social functioning as part of the core symptoms of autism. In contrast to the anxiety research, many of the social functioning studies used outcome measures designed specifically for the study. Again, the reader is reminded that the outcome measures used in each study are listed in Appendix D and that for more specific information and references for these measures, they should refer back to the articles reviewed.

For example, Beaumont and Sofronoff (2008) defined social competence as "engaging in reciprocal positive interactions with others, and responding appropriately to others' behavior" (p. 744). This was further operationalized by the researchers as: being able to control anxiety and anger, initiate and maintain conversations, engage in interactive play, and cope with bullying. Treatment effects were measured using the Emotion Regulation and Social Skills Questionnaire (ERSSQ), a tool designed specifically for this study to assess competence in the skills being taught in the program; the Social Skills Questionnaire: Parent and Teacher Forms (SSQ), an established tool used to assess the child's use of social skills at home and at school; Assessment of Perception of Emotion from Facial Expression which examines children's ability to identify facial expressions in photographs; and the Assessment of Perception of Emotions from Posture Cues which examines children's ability to identify posture cues from photographs. As in some of the studies described previously, James and the Maths Test was used in this study to determine the child's ability to generate coping strategies in

anxious situations; and a tool called Dylan is Being Teased was used to assess the child's ability to generate ideas on coping with bullying at school. This last measure was also used in the Sofronoff et al. (2007) anger management study.

In the Sofronoff et al. (2007) anger management study, the children completed a self-report checklist, and rating scale called What Makes Me Angry. Parents monitored the frequency of anger outbursts of their child, rated their confidence in managing their child's anger, rated their confidence in the child's ability to manage anger, completed the parent form of the Children's Inventory of Anger (ChIA-P), and answered an anonymous feedback questionnaire specifically on the intervention program. Teachers also provided qualitative feedback on changes they had noticed in the child that they attributed to participation in treatment.

Changes in social competence in the Crooke et al. (2007) study were defined as changes in the ability to "acquire, understand and use social knowledge to quickly and accurately respond to verbal and nonverbal social information" (Introduction, para. 3). In measuring treatment outcomes, three verbal and two nonverbal behaviors were operationalized and tracked. For example, an expected verbal behavior that was tracked during the study was, *on topic remark,* which was further defined as "any remark that added to the current topic by adding a topic related comment" (Methods Section, Table 2). Sessions were videotaped, transcribed, and analyzed for the actual occurrence of each behavior. Since one goal of the study was to examine generalization of skills to other settings, in addition to examining the effectiveness of the treatment, generalization probes

occurred four times over the course of treatment at a different location than the treatment setting.

The Bauminger series of studies described social competence in terms of social cognition and emotional understanding (Bauminger, 2002; 2007a; 2007b). They used numerous outcome measures, including the Problem-solving Measure (PMS), the Emotions Inventory, the Social Skills Rating Scale-Teacher Version (SSRS-T), and direct observation of social interactions. The PMS is a frequently used behavioral interview designed to measure children's problem-solving skills, and the reasoning behind their solutions (Bauminger, 2002). The Emotion Inventory measures the child's understanding of simple and complex emotions. The SSRS-T gives a rating of student's social skills including cooperation, assertion and self-control skills.

In addition to tracking changes in specific social skills, Gutstein and his colleagues (2007) also looked at the effects of RDI treatment on autism symptoms, based on the ADI-R and the ADOS. The Flexibility Interview, a semi-structured interview developed by the authors to measure the child's ability to adapt to change and transition, was also used. Consistent with traditional behavior modification studies (e.g., Lovaas, 1987), education placement was targeted as another indicator of treatment effectiveness.

Research Design

Measuring change over time is only one of the essential research design variables to consider in determining how confident we are that a treatment has been effective. Other design features to consider include: whether the treatment was compared to other conditions, and if so, was there random assignment to the different conditions; how well-

documented was the treatment, as evidenced by replicable procedures or use of a treatment manual; what was the training of therapists, and how well did they adhere to the treatment; and whether the results have been replicated, if so, was the research done by a different research team (APA, 1993, Chambless & Hollon, 1998). A table is provided in Appendix E showing which of the reviewed studies were case studies, group studies, used a comparison group, or used random assignment of participants.

Overall, of the studies reviewed, five were case studies and six used small intervention samples with no comparison group. Four studies used random assignment to intervention and control groups. Of the anxiety studies, Chalfant et al. (2007) and Sofronoff, et al. (2005) were two independently conducted studies that used comparison groups with randomized assignment. Characteristics of the client sample and the presenting problem were clearly defined (see section on *Sample Characteristics*). Reliable and valid outcome measures were used (see *Outcome Measures* section). Both studies used treatment manuals with adaptations made to accommodate the characteristics of children with ASD. Treatment integrity efforts were specifically incorporated into the Sofronoff et al. (2005) study. Treatment integrity methods included using a component checklist, videotaping sessions, and independent rating of tapes. Therapists in the Sofronoff et al. study were post-graduate students in clinical psychology programs; participated in one-day training in the intervention; and received weekly supervision. For more details on treatment integrity efforts in the other studies reviewed see Appendix F.

These two independent research studies showing positive treatment effects, using random assignment to different conditions, and following manualized, replicable

procedures, met the basic criteria (APA, 1993) for empirically validating CBT for use with anxious children on the autism spectrum. Additional support for the efficacy of CBT treatment for anxiety in those with ASD was provided by the Oii et al. (2008) group design and five single-case studies, as well as a replication of the Sofronoff et al. (2005) study design extending the use of CBT for anger management issues (Sofronoff et al., 2007) in the ASD population.

Only one of the social functioning studies met the full APA Task Force (1993) design criteria. Beaumont and Sofronoff (2008) used random assignment of children to the intervention or waitlist control group. Characteristics of the client sample and the presenting problem were clearly defined (see sections on *Sample Characteristics* and *Outcome Measures*). Treatment integrity efforts were intentionally incorporated into the design of the study, including therapist training and supervision, a treatment component checklist and treatment manual, videotaping sessions, and independent rating of videotapes. Additional support for the efficacy of CBT treatment for social functioning in those with ASD is provided by Bauminger (2002; 2007a; 2007b) series of group studies, the Crooke et al. (2007) study, and the Gutstein et al. (2007) research.

Based on the APA (1993) Task Force criteria, the CBT studies reviewed here included at least two randomized between group design studies, and a series of case studies; replication by independent research teams; comparison to placebo condition or other treatment; well-documented, replicable procedures or treatment manuals; and clearly defined population and presenting problem (APA, 1993; Chambless & Hollon, 1998). Before we can decide whether there is enough evidence to conclude that CBT is

an efficacious, or probably efficacious treatment in ASD populations, we must examine the treatment itself as well as the results attributed to the treatment. These will be discussed in the next two sections, with a focus on the four most stringently designed studies.

Treatment Description

The reader is referred to Appendix G for information regarding treatment length and type; and Appendix H for a convenient summary comparing the treatment protocols used in each study. Sofronoff and her colleagues (2005; 2007) designed a CBT intervention based on Kendall's empirically supported *Coping Cat* CBT program (Kendall, 2000; Kendall, et al., 1997) for anxious children and on Attwood's CBT- based anxiety and anger management programs (Attwood, 2004a; 2004b; 2004c) for use with children with AS. The anxiety treatment was delivered in six, two-hour sessions over six weeks. Children were randomly assigned to one of two interventions, or a waitlist. The two intervention conditions differed in terms of parent involvement.

According to the description provided by the authors, sessions were highly structured, each child received a workbook to use, homework projects were completed between sessions, and the child as a scientist or explorer was used as a metaphor to enhance motivation. The authors described each session. To summarize, Session 1 explored positive emotions (happiness and relaxation). Session 2 explored anxiety, and the thoughts, feelings and behaviors connected to anxiety, in addition to a toolbox of physical strategies to address anxiety such as exercise and relaxation tools. In Session 3, social and cognitive tools were explored, for example how being alone, or with others,

can be restorative, and using thinking tools such as reality testing to get a clearer, more realistic view of reality. Session 4 explored measuring emotions and using an emotion thermometer. Session 5 introduced Social Stories as an emotion management tool, and the concept of creating an antidote to poisonous thoughts. Session 6 involved designing an anxiety management program. The Sofronoff et al. (2007) anger management study was virtually identical with the exceptions that the treatment focus was on anger management rather than anxiety; and that there was only one intervention condition.

Similar to the Sofronoff studies (2005; 2007), Oii et al. (2008) used a CBT program based on Kendall's (1994) treatment for anxious children and Attwood's (2004c) program for anxious children with ASD, that involved using visual strategies and social stories; understanding and identifying feelings in self and others based on thoughts, behaviors, speech, and physiological reactions; learning anxiety management techniques such as relaxation procedures, physical activities, breathing exercises, and using positive thoughts; and learning problem-solving strategies. Unlike the Sofronoff studies, the Oii intervention was delivered over 16, 90-minute sessions.

Chalfant et al., (2008) delivered their treatment in 12 weekly, two-hour group sessions over six months. Treatment covered recognition of anxious feelings, and somatic reactions to anxiety, simplified cognitive restructuring exercises, modeling and role-plays with practice of anxiety management procedures, coping self-talk, exposure to feared stimuli and relapse prevention. Some adaptations for the ASD learning style included using more visual aides and structured worksheets, devoting a large component to relaxation and exposure training, exposure tasks served as daily homework assignments,

and the cognitive component was simplified to reduce the need for language skills (for example, using a worksheet with a large list of possible alternatives to identify helpful and unhelpful thoughts). A parent component addressed anxiety education, relaxation strategies, cognitive restructuring exercises, graded exposure, parent management training, and relapse prevention.

The Beaumont and Sofronoff (2008) study was unique, in that a computer game was developed to teach emotion recognition, emotion regulation, and social interaction. In the game, the main character was a junior detective who had to decode suspects' thoughts and feelings. In the advanced level, the character used this knowledge in a series of virtual reality missions. Group therapy sessions involved practicing the emotion recognition and social skills learned in the computer game. Home missions involved detecting emotions in themselves and others based on nonverbal cues, practicing relaxation strategies, and using social skills during play dates with peers. Parents prompted and reinforced skills using a token system of reward. According to the article, the Junior Detective Training Program is currently being prepared for dissemination. The article also provided a copy of the ERSSQ and an outline of the content for the seven weekly sessions and teacher handouts, in the appendix. The program itself was designed according to guidelines recommended in the literature to promote treatment effectiveness (such as using visual supports, training social perception skills, and using a step-by-step protocol to teach conversational rules) and generalization (such as parent training, teacher handouts, child home missions, and in-session modeling and role-plays). The intervention took place over seven weekly sessions.

In regard to the case studies reviewed, Cardaciotto and Herbert (2004) delivered an individualized CBT treatment protocol over a period of 14 weeks. The treatment included cognitive restructuring, role-playing, homework assignments, exposure exercises, and social skills training. Reaven and Hepburn (2003) used an individualized CBT protocol which included both the child and parent in psychoeducation, identifying and monitoring symptoms, developing a list of coping tools, gradual exposure based on a hierarchy of stressful situation, practicing coping strategies, and using strategies such as social stories to increase social understanding. The intervention was administered in 14 sessions over five and a half months.

Lehmkuhl et al. (2008) used an individualized CBT treatment protocol similar to that used by Reaven and Hepburn (2003) that included gradual exposure to feared situations using a hierarchy of feared situations; identifying and monitoring anxious thoughts, feelings and OCD behaviors; developing and practicing coping statements and strategies in session and between sessions as homework; and parent involvement. The treatment was delivered over 10, 50-minute sessions over 16 weeks. Sze and Wood (2007; 2008) used an individualized CBT treatment protocol delivered in 16, 90-minute sessions over four months. Similar to the other studies, treatment included typical CBT components such as psychoeducation; cognitive restructuring and other coping strategies; homework assignments; treatment hierarchy; self-awareness, identification, and monitoring of feelings; skills practice; and active parent involvement. Sze and Wood also included social skills, and adaptive self-help skills training components in their programs.

The reader is referred back to the studies in question for more information on and references for the various treatment protocols used.

Of the remaining group studies, the theoretical foundations and the procedures used are well documented, and several treatment designs have been replicated. For example, the Bauminger (2002; 2007a; 2007b) series of studies were designed around an ecological model of treatment. An ecological model situates the child at the centre of a set of overlapping ecological systems. All of these interact to influence the child. The different levels affecting the child (as described by Boemmel & Briscoe, 2001; Broderick & Blewitt, 2006; “Bronfenbrenner’s ecological model”, n.d.; Paquete & Ryan, 2001) include, among others, the *microsystem*, or the layer closest to the child. The parents, teachers, and anyone else in close relationship with the child are part of this first layer. Ecological models of child development predict that forces in this layer (i.e., the immediate environment) will have the most impact on the child’s behaviour (as described by Boemmel & Briscoe; Broderick & Blewitt; “Bronfenbrenner’s ecological model”; Paquete & Ryan). Consequently in Bauminger (2002), the teacher delivered the weekly three-hour intervention in the classroom, skills were practiced with a peer twice a week, and parents at home supported further practice. The entire intervention was delivered over a period of seven months. The intervention was focused on teaching social and emotional understanding: children were given instruction in prerequisite concepts about friendship, affective education, and social-interpersonal problem solving via social vignettes. The article notes that a full description of the intervention is available from the author. The two replication studies (e.g. Bauminger, 2007a; b) improved upon the

original research design (Bauminger, 2002) by using observers and data collectors who were blind to the intervention goals, teacher ratings from teachers unrelated to the treatment implementation, child self-ratings, and looked at long-term effects.

In a sense, the RDI (Gutstein et al., 2007) intervention might also be considered an ecological design, in that the parents were the key change agents for the child, and were given extensive training and supervision in providing scaffolded "opportunities for their child to respond in more flexible, thoughtful ways to novel, challenging and increasingly unpredictable settings and problems" (p. 399), and incorporating these strategies into their daily routines. The RDI model focuses almost exclusively on teaching children with ASD to become more socially connected (Gutstein et al.)**.** Unlike traditional social skills programs, the RDI model does not focus on teaching *instrumental* social skills such as making eye contact, greetings, smiling, turn-taking, or starting a conversation; but instead focuses on teaching r*elationship* skills. *Relationship* skills according to RDI, involve the ability to observe the social environment, rapidly process emotional information about self and others, and use this information to make decisions on what to do in specific situations (Gutstein & Sheely, 2002). Although the intervention is not described in detail in the article reviewed, it is well documented elsewhere (i.e., Gutstein, 2000; Gutstein & Sheely, 2002). Parents attended six days of intensive training in the theory, principles, and components of RDI. Parents delivered the intervention over a period of at least 30 months, for this sample.

Crooke, Hendrix and Rachman (2007) based their CBT intervention on a theoretical model developed by Winner (2002). Winner (2002) hypothesized that is

important to teach the *why* of social situations, as well as ways to self-monitor thinking and behavior based on the expectations demanded by specific contexts. She described how persons with perspective taking (also called social thinking, or social cognition) deficits can benefit from learning specifically about why, for example, it is important to look at other people (it gives you clues as to what that person is thinking about); expected versus unexpected behaviors in specific contexts, and how these behaviors have consequences in terms of how other people think about you; listening with your whole body not just your ears; how to be a social detective, and observe others in the environment for clues; and how to stay on-topic by self-monitoring thoughts and verbal comments.

In their study, unlike many traditional social skills programs, Crooke, Hendrix and Rachman (2007) did not use tangible consequences or rewards to modify behaviors, but instead taught the children "to understand that others had 'thoughts' separate from their own and that 'social' is based on understanding and regulating other's thoughts via their own individual behaviors" (Treatment Measures section, paragraph 1). In designing their program, Crooke, Hendrix and Rachman followed specific treatment recommendations (based on research) for children with ASD made by Krasny et al. (2003) regarding making abstract concepts concrete; providing visual structure to support language; focusing on self and other awareness; and providing opportunities for practice and generalization to *real* world interactions. The treatment was delivered in group sessions of 60 minutes each, over eight consecutive weeks.

Overall Results

Treatment outcomes for anxiety studies. For the reader's convenience a summary of the results of the studies reviewed are reported in Appendix I. Of the research studies targeting anxiety, all participants reported a reduction in anxiety symptoms after CBT treatment. For example, the 23 year old man with AS treated in the Cardaciotto and Herbert (2004) case study no longer met the criteria for social anxiety disorder (SAD) after treatment, and also exhibited improved social functioning and use of coping skills in everyday life. Treatment gains were maintained at a 2-month follow-up. The children in the Chalfant, et al. (2007) study (N=28, ages 8 to13) had significantly fewer anxiety diagnoses after CBT treatment than the waitlist (WL) group, in addition to fewer worries and emotional difficulties. The 12-year-old boy in the Lehmkuhl, et al. (2008) case report no longer met the criteria for obsessive-compulsive disorder (OCD), and this was maintained at 3-month follow-up. The Oii et al. (2008) group of children (N=6, ages 9 to13) had non-significant reductions in anxiety-levels, particularly regarding social phobias and obsessive-compulsive tendencies. The Oii research team also looked at levels of stress in parents and teachers, and reported significant reductions in parent stress and non-significant reductions in teacher stress levels. In the Reaven and Hepburn (2003) case study with a seven-year-old girl, symptoms were reduced by 65%, and the child was able to use the CBT strategies in everyday functioning. The authors reported that OCD symptoms remained well-controlled at follow-up sessions.

Sofronoff and her colleagues (2005) reported no significant changes in symptoms until six-week follow-up, at which time the AS children (N=71, ages 10 to 12) were less

anxious, had fewer social worries, and were able to generate more coping strategies for anxiety provoking situations. According to Chambless and Hollon (1998), there is a growing body of evidence demonstrating that cognitive behavioral interventions may have a delayed effect on functioning that may not emerge until well after treatment has finished. Another important finding in the Sofronoff study, consistent with the literature on anxiety in children (Bernstein, et al., 1997; Dadds & Barrett, 2001; Mendlowitz et al., 1999), was the increased improvement in outcomes associated with parent involvement in treatment.

Parent involvement may also be implicated in the treatment gains found in the Sze and Wood (2007, 2008) research. In the 2007 study, the 11-year-old girl no longer met the criteria for SAD, generalized anxiety disorder (GAD) or OCD and showed improvements in multiple areas of functioning. In the 2008 case, the 10-year-old male no longer met the criteria for social phobia (SoP) or GAD and reported improvements in everyday functioning as well. The boy remained diagnosis free at 3-month follow-up. Parents were highly involved in these two cases. As can be seen in Appendix H parents were involved in most of the studies, to varying degrees, with the exception of the Oii et al. (2008) and the Cardaciotto and Herbert (2004) studies. Parent training in the management of problem behaviors associated with AS, including anxiety management, has been shown to be an effective intervention in its own right (Sofronoff, Leslie, & Brown, 2004).

Treatment outcomes for social functioning studies. Parent training and involvement were also an integral part in five of the social functioning research studies

(i.e., Bauminger, 2002; 2007a; Beaumont & Sofronoff, 2008; Gutstein et al., 2007; Sofronoff, et al., 2007). The reader is reminded that Appendix H provides descriptions of the interventions used including degree of parent involvement. The Gutstein et al. study was relatively unique in that the parents were trained to deliver the intervention to the child. After at least 30 months of treatment, the children (N=16, ages 20 to 96 months), in the Gutstein et al. study no longer met the criteria for autism based on standardized autism diagnostic measures.

As can be seen in Appendix H, parents were also explicitly involved in the first two Bauminger studies (Bauminger, 2002; 2007a). The children (N=15, ages 8 to 17) in the 2002 study demonstrated improvements in social functioning and understanding, based on behavioral interviews and inventories, direct observation, and teacher ratings. In the subsequent replication study (Bauminger, 2007a), children (N=19, ages 7.5 to 11.5) showed an increase in positive social behaviors, generalized these behaviors to situations outside of, and to peers unrelated to the study, and maintained these gains at 4-month follow-up. A second replication study (Bauminger, 2007b) examined the efficacy of a group-centred delivery of the cognitive-behavioral intervention. In this situation, the children (N=26) showed improvements in functioning including increased mutual planning, cooperation, and sharing; and improved recognition of basic and complex emotions. The children did not demonstrate the same generalization effects as Bauminger (2007a). The author (Bauminger, 2007b) hypothesized that this may have been because, unlike the first two studies, parents and peers outside the intervention group were not actively involved in the intervention, limiting opportunities for generalization.

In the remaining studies, the children showed increases in socially appropriate behaviors (Beaumont & Sofronoff, 2008; Crooke, et al., 2007; Sofronoff et al., 2007), decreases in inappropriate behaviors (Crooke et al.; Sofronoff et al., 2007), and increases in emotion-management strategies (Beaumont & Sofronoff; Crooke et al.; Sofronoff et al, 2007). Beaumont and Sofronoff reported maintenance of treatment gains at 5-month follow-up, while Sofronoff and colleagues (2007) reported a 6-week maintenance of treatment gains.

Information regarding the long-term effect of treatment is highly valued, but not often reported according to Chambless and Hollon (1998). In terms of assessing long-term outcomes, eight of the 15 research studies reviewed, reported maintenance of treatment gains for up to 5 months post-treatment.

Summary

The *APA Task Force* (APA, 1993) criteria for determining effective treatments includes having at least two well designed group studies conducted by independent research teams. Studies must demonstrate efficacy of the treatment in comparison to a placebo condition or other treatment. A series of well-designed case studies can also demonstrate efficacy. In addition, studies must use well-documented, replicable procedures or treatment manuals, and clearly define the characteristics of the client sample. Treatments meeting these criteria may be described as *efficacious*.

The research reviewed here, particularly that on using CBT for coexisting anxiety and ASD, seemed to meet these criteria. There were two independent studies on treating anxiety in ASD using randomized clinical group design, as well as a series of single case

studies showing positive outcomes. The group studies compared the CBT treatment to placebo or other condition. The studies were well documented, and used replicable procedures or treatment manuals. Each study clearly defined the population and the presenting problem. A number of studies provided some evidence of therapist training and treatment adherence. All used multimethod outcome assessment and many reported on long-term outcomes. The research on the successful use of CBT to address the social functioning deficits of those with ASD, adds further support to the argument that CBT is an effective treatment for those on the spectrum.

Overall, the evidence reviewed here suggests that CBT delivered in a flexible manner individualized to the ASD child can be effective in reducing symptoms of anxiety and may also have an impact on some of the core features of ASD such as social cognition. The research suggests that CBT can be a very powerful and effective tool for higher-functioning children on the autism spectrum, and may be considered an empirically validated efficacious therapy for this population.

The next chapter will discuss the methods used in conducting this literature review. In particular the ethical and writing standards, as well as the specific search strategy used will be described.

Chapter 4: Method

This chapter describes the methods used in completing this project. It includes the ethical and writing standards. As well, the search strategy and its limits are discussed.

The author of this project adhered to the Canadian Code of Ethics for Psychologists (CPA, 2001) at all times. This project did not require ethics approval as there was no data collection, and no one was interviewed as part of this project. APA publication standards (APA, 2005) were used in the writing of this project.

A systematic search strategy was used to examine the research that has been conducted in the area of ASD and CBT intervention. Databases searched included: Psychological and Behavioral Sciences Collection, GoogleScholar, Sage Publications, Ovid, Expanded Academic ASAP, PsycInfo, Mary Ann Liebert Publishers, Elsevier ScienceDirect, Academic Search Premier, Wiley, Blackwell Synergy, Cambridge University Press, SpringerLink, JSTOR, and EBSCO Host. Key search terms included: autism, Asperger syndrome, ASD, pervasive development disorder, PDD, cognitive behaviour therapy, CBT, intervention, treatment, outcomes, and combinations of these. In addition, the author conducted a reiterative search for specific authors and articles cited as references in the few articles that were located.

The search was limited to those works available on-line, in English, published during, or prior to 2008. This search eventually resulted in 15 research articles specifically examining CBT in treating those on the spectrum. Of these, eight articles used CBT methods to treat anxiety, six articles examined CBT in addressing social functioning, and one addressed anger management.

The next chapter provides a synthesis of the work reviewed. There will also be a discussion of some of the treatment implications and areas for additional research.

Chapter 5: Synthesis With Treatment Implications

This chapter summarizes the work reviewed in chapter 3, highlights a number of strengths and limitations, and suggests some future directions. The synthesis begins by highlighting the prevalence rates.

Current prevalence studies suggest that as many as one child in 165 is diagnosed with a pervasive development disorder (PDD) (Fombonne, n.d.). In addition to the triad of impairments that define ASD, this population is highly likely to exhibit a host of other difficulties including clinical levels of comorbid anxiety and depression, eating disorders, aggression and disruptive behaviors (APA, 2000; Woodbury-Smith & Volkmar, 2008). In addition those with ASD share an increased risk of peer rejection and social isolation, and academic and occupational underachievement (Elder, Caterino, Shacknai, & Simone, 2006; Krasny et al.; White et al.). Outcomes are generally not very positive and it has been argued that better diagnosis and treatment of comorbid disturbances may lead to better outcomes (Kim et al., 2000). The high prevalence rates of ASD, and the co-occurring difficulties in functioning, make it extremely likely for educators and counsellors to come in contact with clients on the autism spectrum. It is the premise of this project that educators and counsellors have an ethical obligation, and a practical need, to be aware of effective strategies for persons on the spectrum. Based on the criteria for empirically supported treatments set out by the *APA Task Force* (APA, 1993), a review of the academic research suggested that CBT, delivered in a flexible manner individualized to the high functioning ASD child, can be considered an empirically

supported intervention for addressing anxiety, social functioning and anger management in this population.

However, it is important to recognize the limitations of this statement. All of the studies reviewed here, were either case studies, or involved relatively small groups of children. The children were all on the high functioning end of the spectrum. In addition, most of the children were between the ages of 7 to14 years, although one study examined children as young as 20 months at the start of treatment. The small sample sizes, limited age ranges, relatively high intellectual functioning of most of the children, and the specific issues addressed by the treatment, make it difficult to generalize the results. More well designed research is needed on whether CBT is more or less effective with different PDD subtypes, intellectual or developmental levels, age groups, or problem areas.

A second challenge to the claim that CBT is an empirically supported intervention comes from the criteria of the APA Task Force (1993) for using *treatment manuals*. Although many of the studies reviewed used *manual-based* treatments, one could argue that because the different research teams did not use *exactly* the same manual, there was not true replication of results (Kazdin & Weisz, 1998). However, Kazdin and Weisz argue that using such conservative standards would rule out many treatments that are currently designated as efficacious.

In spite of this limitation, a number of the studies reviewed clearly used very similar or identical treatment protocols. For example Oii et al. (2008), Sofronoff et al. (2005), and Sofronoff et al. (2007) used treatment protocols based on Attwood's CBT-

based anxiety and anger management programs (Attwood, 2004a; 2004b; 2004c). Although we cannot determine, from the articles themselves, if the different researchers implemented the interventions in *exactly* the same way, we can be relatively certain that these interventions were fairly similar in content.

Attwood's CBT- based anxiety and anger management programs (Attwood, 2004a; 2004b; 2004c) incorporate affective education; an emotion *thermometer* to self-rate the degree of intensity of emotions and help with self- regulation; cognitive restructuring strategies; and an emotion *toolbox* which includes physical activity, relaxation training, thinking, social, and special interest *tools*. These strategies are individualized to the child. For example, according to Attwood, physical tools might include going for a run, bouncing on a trampoline, swinging, sports, dance, cycling, or swimming, depending on the interests of the child. Relaxation tools could include drawing, reading, listening to music, or being alone. Deep breathing or imagery can also be effective relaxation tools for the child. Attwood describes social tools as those that involve the support of other people. Thinking tools are activities that can be used to change thinking or knowledge, such as self-talk strategies, a reality check using logic and questioning, doing research on a topic, and cue-controlled relaxation. Attwood's sessions are highly structured; each child receives a workbook; the metaphor of child as scientist is used; homework is assigned between sessions; and the program incorporates social stories and visual supports. Some of these CBT tools will be discussed individually in more detail next.

Because CBT is typically provided as a *package* of techniques (Kazdin & Weisz, 1999), it is difficult to know which components or combinations of components are responsible for the effects of treatment (Mancini, Ameringen, Bennett, Patterson, & Watson, 2005). More research is needed on the relative contribution to outcomes of each of the CBT treatment components used. However, based on the research reviewed, several components stand out as being important likely contributors to positive outcomes. The reader is referred to Appendices J and K for tables showing the various treatment components used in each study. As discussed earlier, preliminary evidence suggested that including parent involvement and training (e.g., Bauminger, 2002; Beaumont & Sofronoff, 2008; Chalfant, et al., 2007; Gutstein et al., 2007; Sze & Wood, 2008), is likely to enhance treatment outcomes. Appendix K illustrates that parent involvement was an integral component in eleven of the fifteen studies reviewed. More research is needed specifically examining the effect of varying levels of parent involvement, and the degree to which this component affects outcomes.

Based on the research reviewed it also appears that a social cognition training component in the treatment package (Farrugia & Hudson, 2006; Gaus, 2007; Krasny et al., 2003) also may enhance treatment outcomes. All of the studies reviewed included some form of social skills or social understanding training as part of their treatment package. As Appendix J shows, homework and practice of skills in a number of environments may be another key component of treatment.

Examining some of the other CBT components, in light of the research reviewed, suggested additional tools that are likely to be useful to the educator or counsellor in

addressing the specific issues faced by persons on the autism spectrum. The reader is reminded that Appendices J and K highlight the various treatment components used in the studies reviewed. For example, a key component of CBT is thought monitoring, evaluation, and correction (Anderson & Morris, 2006; Gaus, 2007). People on the spectrum have a tendency to interpret things literally and out of context, and demonstrate a variety of cognitive distortions in their thinking (Gaus). A number of cognitive strategies have been used to help the child with AS become aware of their automatic thoughts, evaluate them, and generate more realistic alternatives. Gaus suggests giving the ASD client a list of common cognitive distortions, which allows the person with ASD to recognize patterns "without having to *access* the language to describe them" (p. 170). In addition, seeing items on a list can serve to normalize experiences, and can become part of a common client-therapist language (Gaus). Attwood (1999) recommends strategies such as thought records, social stories, comic strip conversations, using the idea of treating poisonous thoughts with antidotes, and using the individual's special interest such as imagining how Dr. Who would think or act. Externalizing the problem was a cognitive strategy used in a number of the studies (e.g., Reaven & Hepburn; Sofronoff et al. 2005; 2007; Sze & Wood, 2007; 2008) in narrative therapy fashion (Cashin, 2008). These studies also tended to use metaphors such as the child as scientist or explorer, or fighting against the symptoms (e.g., Reaven & Hepburn; Sofronoff et al.2005, 2007; Sze & Wood, 2007). As can be seen in Appendix J, a cognitive component was incorporated into all of the studies reviewed.

Affective education is thought to be another essential CBT component. It is often necessary to help the ASD client explicitly make the connection between thoughts, emotions, and behaviors (Anderson & Morris, 2006; Attwood, 1999; 2004a). It may be necessary to first teach those with AS, why we have emotions, how to recognize emotions in themselves and others, to translate those feelings into words, and to develop ways to reason about thoughts, feelings and behaviors in situations. Some strategies that have been developed to assist in affective education include creating a feelings book (Attwood, 1999; 2004a), using social stories, comic strip conversations, emotion thermometers, and computer programs (Anderson & Morris, 2006; Silver & Oakes, 2001). Appendix J demonstrates that all but one of the studies incorporated an emotion recognition and self-management component into the treatment.

Teaching bodily awareness and self-regulation skills such as relaxation training can be a valuable component of CBT (Gaus, 2007; Gosch et al., 2006). As described by Zipkin (1985), relaxation training techniques can include diaphragmatic breathing (use of slow deep breaths that expand the stomach rather than the chest), progressive muscle relaxation (systematically tensing and releasing major muscle groups), cued relaxation (associating a key word or object with sense of relaxation), yoga (an ancient and complete system of physical, mental, and spiritual development which incorporates physical postures, breath control, mental concentration and deep relaxation), and mental relaxation (including guided imagery and meditation). Some of the documented benefits of relaxation therapy for handicapped children, including those with ASD, are reduced muscular tension and anxiety, decreased hyperactivity and impulsivity, decrease in

disruptive/aggressive behaviors, improved academic achievement, improved quality of handwriting, increased attention span, improvements in communications and interpersonal relationships, and decreased autistic and stereotypic behaviors (Cautela & Groden, 1978; Mullins & Christian, 2001; Zipkin, 1985). As can be seen in Appendix J, eleven of the fifteen studies reviewed incorporated some form of body awareness and self-regulation training. Books on using some of these relaxation strategies with children with autism are commercially available (for example: Betts & Betts, 2006, Cautela & Groden). Research comparing the use of different relaxation techniques for children with ASD would be a valuable addition to the ASD literature.

CBT traditionally involves measuring baseline levels of symptoms such as feelings, thoughts, or behaviors, and follow-up measurements to monitor progress. Anderson and Morris (2006) warn that most traditional rating scales are not validated for use in populations with AS. They note however, "informant information, behaviourally anchored measures (such as weight, sleep patterns, or activity monitoring), and visual measures of subjective distress, such as the "emotional thermometer" (discussed later [in the article]) can be used for baseline measures and monitoring" (p. 4). One example of this strategy, was in the Reaven and Hepburn (2003) use of child self-generated ratings, where the child was asked to draw what her symptoms looked like, using circles to represent the amount of time that was spent on OCD behaviors. An emotion thermometer was also a central component to studies using Attwood's (Attwood, 2004a; 2004b; 2004c) CBT-based anxiety, and anger management programs. Sze and Wood (2007) also specifically mention using a visual feelings thermometer.

Books on using visual emotion rating scales with children with autism are commercially available. For example, *The Incredible 5-Point Scale* is a CBT-type 5-point visual rating strategy developed specifically for children with autism (Buron, 2003; Buron, 2006; Buron & Curtis, 2003). It has been used by Buron and Curtis for helping children assess and regulate voice volume; control obsessions; manage stress; manage problem behaviors; use appropriate touching; recognize and manage fear, anxiety, shyness and anger; and teach self-monitoring, and relaxation strategies.

In addition to visual emotion rating scales, many other visual strategies have been intentionally and explicitly incorporated into most of the studies reviewed. Appendix L provides a convenient table comparing the research articles on use of visual and narrative strategies. Some of the specific visual strategies used in these studies included: worksheets, workbooks, lists, reward charts, thought records, and behavior monitoring charts. The computerized intervention was a relatively unique visual strategy developed as part of the Beaumont and Sofronoff intervention (2008). Sze and Wood (2007) described drawing cartoon scenarios based on the child's special interest, and drawing thought bubbles on the cartoon. This closely fits the description (see below) of a comic strip conversation. Using Social Stories and/or comic strip conversations was explicitly mentioned in many of the studies.

Social stories and comic strip conversations are CBT-type strategies developed by Carol Gray to visually communicate information, help the child become more aware of, and increase understanding of thoughts, feelings, and expected behaviors, in specific situations (Anderson & Morris, 2006; Gray Center, n.d.; Rogers & Myles, 2001). Using

social stories "involves creating a short story that describes the situation and includes appropriate actions and expressions" (Attwood, 1998, p. 33). The story is individualized to the child and the situation, and serves to answer the *wh* questions (Gray Centre, n.d.). In other words, social stories are used to help the child become more aware of what others are thinking, and what their own behaviors should be, in specific situations. The Gray Centre website (Gray Centre, 2008) provides a list of references for research on using Social Stories. In a review of the empirical research on Social Stories, Reynhout and Carter (2006) identified eleven peer-reviewed journal articles and five unpublished dissertations. The authors conclude, "Social Stories stand as a promising intervention, being relatively straightforward and efficient to implement with applications to a wide range of behaviors" (p. 445). The author's further call for, more research on "the exact nature of their contribution and the components critical to their efficacy" (p. 445).

Comic strip conversations involve using simple drawings to illustrate an ongoing conversation (Gray, 1994). Stick figures with talking or thinking bubbles are used to systematically identify what people do, say, and think in situations (Anderson & Morris, 2006; Winner, 2007a). Color is used to represent the emotional content of the thoughts and statements. Using the stick figures, one can explore the client's interpretation of events, and their rationale for their own thoughts and behaviors, as well as how alternate responses might affect the situation. This technique capitalizes on the relative good understanding of photographic/pictorial representations that most children with autism show (Wellman et al., 2002). Teaching children with autism to use thought-bubbles as a pictorial device for representing mental states, has been shown empirically, to be a useful

visual strategy for helping children with autism reason about social situations (Wellman, et al.).

Social behavior mapping (SBM) is another example of visual cognitive-behavioral tool, developed by Winner (2007b; 2007c; 2007d), as part of her ILAUGH model, to teach children with autism the *dos* and *don'ts* of everyday behavior. Each social behavior map consists of two pages listing expected behaviors in a particular context, how the behaviors make others feel, the consequences, and how the student feels; and unexpected behaviors in a particular context, how the behaviors make others feel, the consequences, and how the student feels. Social behavior maps can be created to explore the expectations of any social context. Winner has provided numerous examples of these in her book *Social Behavior Mapping* (Winner, 2007c), including social behavior maps for common activities like riding on a school bus, eating in the cafeteria, silent reading, standing in line, attitude in class, talking to friends on cell phones, safety on the internet, personal hygiene, doing chores, mealtimes with family, and bedtime. The two page map is used throughout the day to *catch* the student doing what is expected, or unexpected. A behavior, another's feeling, a consequence, and the student's emotion, are circled and connected for each behavior observed, to create a map showing the set of consequences resulting from the initial behaviors. Winner (2007d) emphasizes however, that the ultimate goal is to pay the most attention to the performance of expected behaviors. Although this tool is not explicitly used in any of the studies, as far as can be determined, the Crooke et al. (2007) intervention is explicitly designed around Winner's ILAUGH model of social cognition.

This discussion of the various intervention components used, in the studies reviewed, is not intended to provide a comprehensive list of CBT strategies. Rather, this chapter serves to illustrate the point that there are numerous CBT-type tools that are currently available to the counsellor or service provider, that have been specifically designed for use with those on the autism spectrum. Many of these tools were also incorporated into the treatment protocols of the research reviewed here. Adding some of these tools to an educator or counsellors' toolbox can enhance practice for the professional, and improve outcomes for the AS client.

In this sense, CBT, as a *package of strategies,* can be considered a treatment strength, in terms of suggesting a variety of potential CBT techniques to draw upon, based on the individual needs of the client. According to Meara and Patton (1994) counsellors contribute both personal qualities, and technical procedures to the therapeutic working alliance. A therapeutic working alliance involves two parties collaboratively working together toward client change, with the client being seen as the relative expert in the goals, and the therapist as the relative expert in the ways to reach the goals (Horvath, 2000). In other words, it is the responsibility of the therapist to bring to the client-therapist relationship, the technical skills and knowledge of how to direct the process of therapy towards the mutually agreed upon goals (Hiebert, 2001).

To summarize, although CBT appears to be effective in reducing some of the symptoms associated with autism spectrum disorders, more research is clearly needed. For example, more well designed research is needed on whether CBT is more or less effective with different PDD subtypes, intellectual or developmental levels, age groups,

or problem areas. In addition, more research is needed on the relative contribution of the various treatment components traditionally provided as part of a CBT treatment package. It appears that parent involvement and social training may be key components to include in a treatment package for persons on the spectrum. However, other components to consider are relaxation strategies, cognitive restructuring, and affective education. Visual strategies such as checklists, charts, emotion thermometers, social stories and social scripts may serve to enhance the effectiveness of the interventions. Overall, however, like any other treatment, the strategies chosen should be based on a comprehensive assessment of the individual abilities and needs of the child. The ideal treatment should capitalize on the strengths of the child, while addressing his or her specific needs (Krasny et al., 2003).

Dissemination of the information provided in the project is an important next step. Research dissemination is one key to opening the door to knowledge utilization (Jones & Santaguida, 2005; Marsh 2002; Marsh 2003). The use of research can improve or direct practice and can enhance professional credibility (Jones & Santaguida; Marsh 2002; Marsh, 2003) as well as leading to improved client outcomes. This project can potentially impact not only those who work with people on the spectrum, but also those with ASD, and their families by giving them up-to-date information to help them make informed choices about treatment. There are implications for society as a whole in terms of improved functioning, resulting in decreased need for external societal supports. The practical information implied by the treatments reviewed in this paper can have an immediate impact on quality of life for people with ASD.

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Appendix A

List of the 15 Autism Studies Using CBT That Were Included in This Project

1. Bauminger, N. (2002). The facilitation of social-emotional understanding and social interaction in high functioning children with autism: Intervention outcomes. *Journal of Autism and Developmental Disorders, 32*(4), 283-298.
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3. Bauminger, N. (2007b). Brief report: Individual social-multi-modal intervention for HFASD. *Journal of Autism and Developmental Disorders, 37*, 1593-1604.
4. Beaumont, R., & Sofronoff, K. (2008). A multi-component social skills intervention for children with Asperger syndrome: The junior detective training program. *The Journal of Child Psychology and Psychiatry, 49*(7), 743-753.
5. Cardaciotto, L., & Herbert, J. (2004). Cognitive behavior therapy for social anxiety disorder in the context of Asperger's syndrome: A single-subject report. *Cognitive Behavioral Practice 11*, 75-81.
6. Chalfant, A., Rapee, R., & Carroll, L. (2007). Treating anxiety disorders in children with high functioning autism spectrum disorders: A controlled trial. *Journal of Autism and Developmental Disorders, 37*, 1842-1857.
7. Crooke, P., Hendrix, R., & Rachman, J. (2007). Brief report: Measuring the effectiveness of teaching social thinking to children with Asperger syndrome (AS) and high functioning autism (HFA). [Electronic Version]. *Journal of Autism and Developmental Disorders*. Retrieved April 2008 from Springer Science + Business Media.

8. Gutstein, S., Burgess, A., & Montfort, K. (2007). Evaluation of the relationship development intervention program. *Autism, 11*(5), 397-411.

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10. Ooi, Y., Lam, C., Sung, M., Tan, W., Goh, T., Fung, D., et al. (2008). Effects of cognitive-behavioral therapy on anxiety for children with high-functioning autistic spectrum disorders. *Singapore Medical Journal, 49*(3), 215-220.

11. Reaven, J., & Hepburn, S. (2003). Cognitive-behavioral treatment of obsessive-compulsive disorder in a child with Asperger syndrome. *Autism, 7*(2), 145-164.

12. Sofronoff, K., Attwood, T., & Hinton, S. (2005). A randomised controlled trial of a CBT intervention for anxiety in children with Asperger syndrome. *Journal of Child Psychology and Psychiatry, 46*, 1152-1160.

13. Sofronoff, K., Attwood, T., Hinton, S., & Levin, I. (2007). A randomised controlled trial of a cognitive behavioral intervention for anger management in children diagnosed with Asperger syndrome. *Journal of Autism and Developmental Disorders, 37*, 1203-1214.

14. Sze, K., & Wood, J. (2007). Cognitive behavioural treatment of comorbid anxiety disorders and social difficulties in children with high-functioning autism: A case report. *Journal of Contemporary Psychotherapy, 37*, 133-143.

15. Sze, K., & Wood, J. (2008). Enhancing CBT for the treatment of autism spectrum disorders and concurrent anxiety. *Behavioural and Cognitive Psychotherapy, 36*, 403-409.

Appendix B

Table Comparing the Research Articles on Sample Size and Diagnosis, Gender, Age and IQ Level

Study	Sample Size And Diagnosis	Gender	Age	Comments on IQ Levels
Anxiety Studies				
Cardaciotto & Hebert, 2004.	1 AS with SAD	1 M	23	Not reported. By definition of AS, IQ would be in normal or above range
Chalfant et al., 2007.	28 HFA with anxiety disorders. Compared to: 19 WL (HFA) with anxiety disorders.	35 M, 12 F	8-13	Borderline to superior intellectual functioning and age-appropriate language skills.
Lehmkuhl et al., 2008.	1 HFA with OCD	1 M	12	92 (average range), based on Stanford-Binet Intelligence Scale-4th ed
Ooi et al., 2008.	6 HFA with issues related to anxiety	6 M	9-13	FSIQ 80+, based on WISC-III
Reaven & Hepburn, 2003.	1 AS with OCD	1 F	7	135-145, based on Stanford-Binet Fourth Edition
Sofronoff et al., 2005.	71 AS with clinical anxiety Compared to: normal sample, and clinically anxious sample.	62 M 9 F	10-12	90-137, based on Short form of WISC-III
Sze & Wood, 2007.	1 HFA with SAD, GAD, and OCD	1 F	11	Above average cognitive abilities

Sze & Wood, 2008.	1 AS with GAD and social phobia	1 M	10	Not reported
Anger Management				
Sofronoff et al. 2007.	24 AS Compared to: 21 AS, WL control	23 M, 1 F. 20 M, 1 F.	10-14	95-132, based on WISC-III
Social Functioning				
Bauminger, 2002.	15 HFA	11 M 4 F	8-17	VIQ 69+, Mean 84.87, based on WISC-R
Bauminger, 2007a.	10 HFA, and 9 AS	18 M 1 F	7.5-11.5	FSIQ and/or VIQ 75+, Mean 106.2, Range 75-128, based on WISC-R
Bauminger, 2007b.	11 HFA from Bauminger 2007a study, and 15 matched on CA, VIQ, PIQ, FSIQ, ADI-R scores	24 M 2 F		FSIQ or VIQ 75+
Beaumont & Sofronoff, 2008.	26 AS Intervention Compared to: 23 AS WL control		7.5-11	IQ 85+, based on WISC-III
Crooke et al., 2007.	6 AS or HFA	6 M	9-11	VIQ 85-115
Gutstein et al., 2007.	16 Autism, AS, or PDDNOS	15 M 1 F	20-96 months	IQ 70+

Appendix C

Table Comparing the Research Articles on Criteria Used to Diagnose Autism and the Problem Studied

Study	Criteria Used to Diagnose Autism	Problem Studied
Anxiety Studies		
Cardaciotto & Hebert, 2004.	DSM-IV, ASDI	Anxiety, based on SCID-IV
Chalfant et al., 2007.	Pediatrician, psychiatrist or clinical psychologist documented	Anxiety, based on parent and child report on ADIS
Lehmkuhl et al., 2008.	DSM-IV by independent psychologist	Anxiety, based on DSM-IV-TR
Ooi et al., 2008.	Psychiatrist, based on DSM-IV	Anxiety symptoms identified by psychologist
Reaven & Hepburn, 2003.	ADI-R	Anxiety, based on CY-BOCS
Sofronoff et al., 2005.	Pediatrician diagnosis of AS, based on DSM-IV, confirmed by CAST	Anxiety, based on parent report
Sze & Wood, 2007.	ADOS, ADI-R	Anxiety, based on ADIS-C/P
Sze & Wood, 2008.	DSM-IV	Anxiety, based on ADIS-C/P
Anger Management		
Sofronoff et al. 2007.	DSM-IV, CAST	Anger, established by both parent and child interview

Social Functioning		
Bauminger, 2002.	DSM-IV, ADI-R	Social competence: based on ability to solve social problems, emotional understanding, and social interaction with peers.
Bauminger, 2007a.	DSM-IV, ADI-R	Social competence
Bauminger, 2007b.	DSM-IV, ADI-R	Social competence
Beaumont & Sofronoff, 2008.	DSM-IV, confirmed by CAST	Social competence: operationally defined as engaging in reciprocal positive interactions with others, and responding appropriately to others' behaviors. This included controlling feelings of anxiety and anger, initiating and maintaining conversations, engaging in interactive play, and coping with bullying.
Crooke et al., 2007.	DSM-IV, ADOS, ADI-R	Social cognition: ability to acquire, understand and use social knowledge to quickly and accurately respond to verbal and nonverbal social information.
Gutstein et al., 2007.	ADI-R, ADOS	Experience-sharing: dynamic social-emotional and social-cognitive abilities, employed for sharing and integrating unique experiences with others.

Appendix D

Table Comparing the Research Articles on Outcome Measures Used to Assess the Effects of Treatment

Study	Outcome Measures Used to Assess the Effects of Treatment
Anxiety Studies	
Cardaciotto & Hebert, 2004.	SCID-IV, CGI, LSAS, BDI-II, SPAI, Behavioral assessment of social skills performance.
Chalfant et al., 2007.	ADIS-C/P, RCMAS, SCAS-C/P, CATS, SDQ-P/T.
Lehmkuhl et al., 2008.	CY-BOCS, Clinical interview
Ooi et al., 2008.	SCAS-C/P, PSI, ACAS, ITS
Reaven & Hepburn, 2003.	CY-BOCS, Child self-generated ratings
Sofronoff et al., 2005.	James and the Maths Test, SCAS-P, SWQ-P
Sze & Wood, 2007.	ADIS-C/P; Parent report measures of anxiety, social skills, and adaptive functioning; Treatment satisfaction questionnaire.
Sze & Wood, 2008.	ADIS-C/P, CGI, MASC, CBCL, SSRS, VABS, Qualitative data
Anger Management	
Sofronoff et al. 2007.	Dylan is being Teased, What Makes Me Angry questionnaire, and parent monitored anger outbursts (instances when child was unable to maintain emotional control and behaved or spoke inappropriately or in anger). Parent rated confidence in managing child's anger. Parent rated confidence in child's management of own anger, ChIA-P, Qualitative questionnaire

Social Functioning	
Bauminger, 2002.	Problem-Solving Measure (PSM), Emotion Inventory, Social Skills Rating Scale (SSRS), Observation of social interaction
Bauminger, 2007a.	PSM, Emotion Inventory, SSRS, Observation of social interaction, Affective Matching Measure, Self-perception Profile for Children, Loneliness Rating Scale.
Bauminger, 2007b.	PSM, Emotion Inventory, Observation of social interaction, Affective Matching Measure, Companionship Measure, Strange Story Measure, D-KEFS sorting subtest
Beaumont & Sofronoff, 2008.	SSQ, ERSSQ, Assessment of Perception of Emotion from Facial Expression, Assessment of Perception of Emotion from Posture Cues, James and the Maths Test, Dylan is Being Teased
Crooke et al., 2007.	Three verbal and two nonverbal behaviors were defined and measured by determining the frequency of each behavior during a social exchange. Baseline measures were obtained. Generalization was measured four times over the course of treatment.
Gutstein et al., 2007.	ADI-R, ADOS, Flexibility Interview, Educational placement.

Appendix E

Table Comparing the Research Articles on Design Characteristics

Study	Case Study	Group Study	Comparison Group	Randomized Design
Anxiety Studies				
Cardaciotto & Hebert, 2004.	X			
Chalfant et al., 2007.			Waitlist	X
Lehmkuhl et al., 2008.	X			
Ooi et al., 2008.		X		
Reaven & Hepburn, 2003.	X			
Sofronoff et al., 2005.			Intervention 1 (child only), Intervention 2 (child and parent). Waitlist, Normal, and Clinically Anxious comparison samples.	X
Sze & Wood, 2007.	X			
Sze & Wood, 2008.	X			

Anger Management			
Sofronoff et al. 2007.		Waitlist	X
Social Functioning			
Bauminger, 2002.	X		
Bauminger, 2007a.	X		
Bauminger, 2007b.	X		
Beaumont & Sofronoff, 2008.		Waitlist	X
Crooke et al., 2007.	X		
Gutstein et al., 2007.	X		

Appendix F

Table Comparing the Research Articles on Treatment Integrity Efforts

Note: Treatment integrity efforts include indicators of therapist training and treatment adherence. In other words they are any efforts included to insure that the treatment is delivered the way it is supposed to be delivered.

Study	Treatment Integrity Efforts
Anxiety Studies	
Cardaciotto & Hebert, 2004.	Not explicitly reported on.
Chalfant et al., 2007.	Treatment provided by registered female clinical psychologists. Treatment integrity not formally measured.
Lehmkuhl et al., 2008.	Treatment provided by trained postdoctoral fellow supervised by experienced author (Storch).
Ooi et al., 2008.	Treatment provided by therapists holding postgraduate degrees in psychology and experience working with children with ASD, assisted by collaborators in study.
Reaven & Hepburn, 2003.	Child was prescribed medication for anxiety and OCD symptoms in third month of treatment.
Sofronoff et al., 2005.	Therapists were post-graduate students in clinical psychology; Therapists participated in one-day training workshop in intervention, worked from therapist manual, and received weekly supervision; Treatment integrity methods included using component checklist, videotaping, and independent rating of tapes.
Sze & Wood, 2007.	Not explicitly reported on.
Sze & Wood, 2008.	Not explicitly reported on.

Anger Management	
Sofronoff et al., 2007.	As in Sofronoff et al. (2005): Therapists were post graduate students in clinical psychology program, Therapists received full day workshop in intervention, and weekly supervision. Therapist manual and Session Checklists were used. 25% of sessions were videotaped and checked for protocol adherence. Copy of *Dylan is Being Teased*, and *Trainer's Notes* included in Appendix
Social Functioning	
Bauminger, 2002.	Teachers were trained in intervention by author, and a research coordinator. Two raters were used to independently code a randomly selected 40% of children's responses on PSM, with agreement from 95-100%. Interrater agreement on Emotion Inventory was 66-100%. Appendix provided: *Content Analysis for Problem-solving Measure, Illustration of the Social-Interpersonal Problem-Solving Curriculum,* and *Definitions of Observed Social Behaviors*
Bauminger, 2007a.	Three MA students who were blind to study hypothesis and goals collected the data. Teachers who were uninvolved in the training completed the SSRS. High interrater agreement on coding of measures
Bauminger, 2007b.	Appendix provided: *Definitions for Observed Companionship Behaviors*
Beaumont & Sofronoff, 2008.	Therapists were interns enrolled in post-graduate clinical psychology and counselling degrees. Make-up appointments were given for missed sessions. Therapist manual and Session Checklists were used. 25% of sessions were videotaped and examined by independent raters for treatment integrity. Appendix provided: copy of *ERSSQ* and *Content for Group Sessions and Teacher Handouts*

Crooke et al., 2007.	All sessions were videotaped and analyzed. Two raters who were blind to the study, independently coded one-third of all videotape samples used and agreement was 100%. Provided *General Lesson Descriptions* in Appendix
Gutstein et al., 2007.	Systemized treatment. Parents videotape themselves working with child, and review tapes with therapist.

Appendix G

Table Comparing the Research Articles on Treatment Length and Type

Study	Treatment Length	Treatment Type
Anxiety Studies		
Cardaciotto & Hebert, 2004.	14 weeks	Individualized CBT
Chalfant et al., 2007.	12, 2-hour sessions over 6 months.	Group CBT
Lehmkuhl et al., 2008.	10, 50-minute sessions over 16 weeks.	Individualized outpatient CBT
Ooi et al., 2008.	16, 90-minute sessions over 4 months	Group CBT
Reaven & Hepburn, 2003.	14 sessions over 5.5 months.	Individualized CBT
Sofronoff et al., 2005.	6, 2-hour sessions over 6 weeks.	Group CBT
Sze & Wood, 2007.	16, 90-minute sessions over 4 months.	Individualized CBT
Sze & Wood, 2008.	Not given	Individualized CBT
Anger Management		
Sofronoff et al. 2007.	6, 2-hour weekly sessions	Group CBT
Social Functioning		

Bauminger, 2002.	3 hours per week by teacher in class, over 7 months. Twice weekly meeting with peer to practice skills.	Individual cognitive-behavioral-ecological (CB-E) with child in classroom setting
Bauminger, 2007a.	Replicated Bauminger (2002)	Individual CB-E with child in classroom setting
Bauminger, 2007b.	Replicated Bauminger (2002, 2007a) Groups met twice weekly over 7 months. The HFA children also met with the teacher, once weekly to practice lessons taught in the small groups.	Group CB-E (1-3 children with ASD and 2 typical peers in each group) in school setting.
Beaumont & Sofronoff, 2008.	2 hour training session for parents prior to intervention. Children and parents attended 7, 2-hour, weekly sessions	Part of the session was devoted to individual family game play. Part of the session was small group/concurrent parent training
Crooke et al., 2007.	8, 60 minutes sessions, over 8 consecutive weeks.	Group sessions at a structured clinic-based setting and at a non-structured, non-treatment generalization setting
Gutstein et al., 2007.	Parents attended 6 days of intensive workshops in the theory, principles, and components of RDI. Regular meetings with a certified RDI consultant. At least 30 months duration.	Parents delivered individualized intervention to their own child in vivo.

Appendix H

Table Comparing the Research Articles on Treatment Details Such as the Model, Techniques Used, Modifications, and Parent Involvement

Study	Treatment Details
Anxiety Studies	
Cardaciotto & Hebert, 2004.	Treatment Model: Treatment based on protocol developed by Heimberg and Becker (see article for references) addressed client's fear of social situations. Intervention techniques included cognitive restructuring; role-playing; weekly homework; and skills training on: initiating, maintaining, and ending conversations, meeting new people, dating, assertiveness, and job interviewing. Homework: thought-listing, cognitive restructuring, and exposure exercises. Modifications: used step-by-step explanations, rehearsal by role-play, and in vivo practice of specific social skills and cognitive restructuring processes.
Chalfant et al., 2007.	Treatment Model: Protocol based on the *Cool Kids* program (see article for references) for anxiety. Interventions covered recognition of anxious feelings and somatic reactions; cognitive restructuring exercises; modeling, role-plays and practice of anxiety management procedures; coping self-talk, exposure to feared stimuli, and relapse prevention. Adaptations: used more visual aides, structured worksheets and lists; increased component devoted to relaxation and exposure; cognitive component simplified to reduce need for language skills (for example used worksheet with large list of possible alternatives to identify helpful and unhelpful thoughts). Homework: exposure tasks Parent component: addressed anxiety education, relaxation strategies, cognitive restructuring exercises, graded exposure, parent management training and relapse prevention.

Lehmkuhl et al., 2008.	Treatment Model: Exposure and Response Prevention (ERP) treatment protocol for OCD (see article for references) involves gradual exposure, in vivo, to feared stimuli and situations based on a hierarchy of the individual's fears; and response prevention. Session 1 and 2: involved psychoeducation and hierarchy construction related to contamination concerns; homework; and exposure exercises in office setting. Sessions 3 to 8: review homework; identify, review and practice coping statements; identify and monitor physiological indicators of distress during sessions. Sessions 9 and 10: focused on termination and relapse prevention Homework: identify and monitor anxious thoughts using a thought record; used a behavior monitoring chart to self-monitor OCD behaviors, attempted and completed exposures, exposure in classroom settings, and practicing coping statements. Used behavior reward system to minimize aberrant behavior, and improve adherence to exposure homework Modifications based on needs of child: cognitive component was modified to the developmental level of child. Parents and teachers were involved as coaches.
Ooi et al., 2008.	Treatment Model: used cognitive and behavioral techniques based on Kendall and Attwood treatment protocols (see article for references), such as role-plays, modeling, rehearsal, and group discussion were used to teach children problem-solving skills and relaxation procedures in social situations. Session 1-3: focused on understanding and identifying feelings in self and others based on physiological reactions, thoughts, behaviors and speech. Session 4-8: focused on anxiety management techniques such as relaxation procedures, physical activities, breathing exercises and positive thoughts. Sessions 9-15 focused on problem-solving strategies based on the STAR procedure (STOP, THINK, ACT, and REFLECT). Adaptations included using visual cues and social stories.

Reaven & Hepburn, 2003.	Treatment Model: based on CBT treatment protocol developed by March and Mulle (see article for references) addressed OCD symptoms, but not pre-occupation with special interests. Step 1: Psychoeducation with parent and child about symptoms of OCD, used child's literal style and visual strategies such as written schedules, drawing OCD symptoms, and created lists to explain visually what was discussed verbally. Step 2: Mapping symptoms: used drawings or other representations to cultivate awareness of OCD behaviors, for example drawing circles to represent how much time was spent on OCD behaviors; or used score sheets to keep track of when OCD occurred at home, and who 'won' in the 'fight' against OCD. Step 3: Established a hierarchy based on level of distress, distress measured using a fear thermometer, incorporated child's idiosyncratic expressions and ideas into treatment. Step 4: Exposure and Response Prevention (ERP): generated a list of tools to beat OCD (ways to stop self from engaging in obsessions and compulsions such as labeling it and using positive self-talk like "I can beat OCD" or other distraction strategies). Practiced using these tools on low-anxiety-rated exposure situations. Visual strategies were an integral part of this step. Step 5: Exposure to other situations higher on the hierarchy. Follow-up sessions to prevent relapse and maintain gains. Parent highly involved in treatment Modifications based on characteristics of AS presented in Table 2, p. 159 included: structuring interactions; involving the child in decision-making; using the child's special interests; being direct, factual and explicit in communication; making lists and rules; defining terms; rating feelings on continuous (not categorical) scale; using language-based interventions such as social stories and visual cues to support communication, among others.

Sofronoff et al., 2005.	Treatment Model: Attwood's CBT protocol for children with AS for reducing symptoms of anxiety (see article for references) Intervention 1: 8 groups of three children each. Parents met with therapists after sessions. Intervention 2: 9 groups of three children each. Parents were trained to be co-therapists. Sessions were highly structured, each child received a workbook to use, homework projects were completed between sessions, and the child as a scientist or explorer, was used as a metaphor to enhance motivation. Session 1: explored positive emotions (happiness and relaxation). Session 2: explored the thoughts, feelings and behaviors connected to anxiety; in addition to a toolbox of physical strategies to address anxiety, such as exercise and relaxation tools. Session 3: social and cognitive tools were explored, for example how being alone or with others can be restorative, and using thinking tools such as reality testing to get a clearer more realistic view of reality. Session 4: explored measuring emotions, and using an emotion thermometer. Session 5: introduced Social Stories as an emotion management tool, and the concept of creating an antidote to poisonous thoughts. Session 6: designed an individualized anxiety management program.
Sze & Wood, 2007.	Treatment Model: *The Building Confidence* FCBT protocol (see article for references) was used to treat anxiety. Modular format allows provision of individually tailored program. Modules include: psychoeducation, self-help skills, coping skills, social skills, relaxation, anxiety hierarchy and reward system, exposure/response prevention. Session 1-3: psychoeducation about ASD and anxiety, and ways to fight back against these. Cognitive restructuring exercises focused on teaching child to challenge her anxious thoughts. Skills training-independence skills. The child was given homework to try out three self-help tasks that she was able to do, but was not doing consistently on her own. Tasks were added as treatment progressed. The mother was encouraged to gradually reduce assistance provided to child in daily routines, and to offer choices.

	Sessions 4-5: developed a symptoms hierarchy, and specified treatment goals. Used a visual feelings thermometer consisting of faces, showing a range of distress, to rate difficulty or fear of situations, for each scenario on hierarchy. Used a point system to track completion of homework. Points accrued to gain child access to desired items. Sessions 6-15: Skills application and practice. Starting with tasks rated by child as easy, and progressing to more challenging situations, identified ways to deal with situations, and practiced using coping strategies in real life situations. Friendship training involved extensive practice, role-playing, and in vivo playmates with peers. At school, teachers nominated peers who were trained to approach the child, and invite into playgroups, during recess and lunch. Session 16: Termination, involved a review of techniques, and discussion of maintenance plans. Parent was actively involved in treatment, and was trained to use CBT techniques at home. Modifications: reduced emphasis on abstract spoken language by using more role-plays and visual materials; illustrated key concepts in simple terms; used child's special interest as examples or metaphors (ex: how would Indiana Jones deal with that?); drew scenarios with cartoon characters and used thought bubbles to explore responses to Socratic questions posed by therapist); incorporated child's idiosyncratic language; used a visual self monitoring strategy of putting bracelets on one arm which were transferred to the other arm when child brought up perseverative interests.
Sze & Wood, 2008.	Treatment Model: addressed anxiety and core ASD features. Same protocol as Sze and Wood, 2007. Common CBT techniques included: cognitive restructuring, thought bubbles, and hierarchical exposure. To enhance these, visual aids and child's special interests were incorporated. A systematic homework exposure hierarchy was developed and implemented, supported by reinforcement.

	Pivotal conversation skills were targeted for practice in and out of sessions. Friendship skills training involved providing child with easily recalled and frequently practiced heuristics about pivotal social behaviors. Parents were taught social skills coaching strategies. A guided discovery approach using systematic Socratic questioning targeted awareness of child's impact on others (e.g., What are some things that fifth graders do that are not cool?). Based on this, a plan was developed by child called "keeping my cool at school" to manage behaviors at school. The teacher who sent home a checkbox on specific behaviors, which were transferred onto a reward chart at home, supported this strategy. This strategy in addition to a graduated hierarchy was used to reduce crying at school as well as stereotyped hand mannerisms. Lastly, a mentoring opportunity was created for the child to supervise a group of first graders during snack time. This involved advanced preparation of identifying positive cognitions of mentors and their role, using cartoons and thought bubbles, therapist modeling mentoring, therapist supervised mentoring, and independent mentoring with support from a teacher. A social coaching technique was taught to parents to support the child in practicing these skills in real-world situations. This involved the parent prompting the child to plan for specific social behaviors (verbal and nonverbal) that could result in positive responses from others, encouraging the child to think through the plan and think through why he would select specific behaviors, and offer corrective feedback as needed. Follow-up conversations then involved analyzing the social interaction, and praising the use of skills.
Anger Management	
Sofronoff et al., 2007.	Sessions were virtually identical to those described in Sofronoff et al. (2005) except the thoughts, feelings, and behaviors explored were around anger, rather than anxiety. Comic Strip Conversations, Social Stories, and role-plays were used during child sessions. Parents receive instruction on same strategies children were taught.

Social Functioning	
Bauminger, 2002.	Treatment Model: Adaptation of *Interpersonal Problem Solving Model* (Spivack & Shure, 1974) and *I Found a Solution* (Margalit & Weisel, 1990) social skills program (references as given by author of paper) Specific focus on social and emotional understanding: given instruction in prerequisite concepts about friendship, affective education, and social-interpersonal problem solving via social vignettes, which were taught by teacher, practiced with peer, and supported by parents. A full description is available from author. Ecological treatment model incorporated parents, teachers and peers.
Bauminger, 2007a.	As in Bauminger, 2002
Bauminger, 2007b.	As in Bauminger 2007a. Each lesson involved teaching, and practicing skills. The teaching component incorporated interpersonal problem solving skills based on vignettes, affective education, and cognitive restructuring using cartoon figures to illustrate thoughts, feelings, and behaviors in a variety of situations. The practice component involved cooperative activities, and role-plays with peers. Parents and peers outside the intervention group were not actively involved.
Beaumont & Sofronoff, 2008.	Treatment Model: a computerized intervention was designed to teach emotion recognition, emotion regulation, and social interaction. In the game, the main character was a junior detective who had to decode suspects' thoughts and feelings. In the advanced level, the character used this knowledge in a series of virtual reality missions. Group therapy sessions involved practicing the emotion recognition and social skills learned in the computer game. Home missions involved detecting emotions in themselves and others based on nonverbal cues, practicing relaxation strategies, and using social skills during play dates with peers. Parents prompted and reinforced skills using a token system of reward.

	Session 1, 2: parents and children played the computer game for the first hour. Children attended small group therapy and parent attended training sessions for the second hour. Session 3, 4: involved 45-min. of computer time and 75-min. of small group/parent training. Session 5, 6: small group therapy/parent training. Session 7, and 6-week follow-up: one hour of group therapy/parent session, and one hour re-assessment. Parent training was facilitated by chief investigator, and paralleled content of children's sessions. Handouts for teachers were also supplied.
Crooke et al., 2007.	Treatment Model: Based on Michelle Garcia Winner's ILAUGH model (2000, 2003, 2007d) for understanding, assessing and teaching social thinking. The ILAUGH acronym refers to the ability to: Initiate, Listen with eyes and brain, understand and use Abstract and inferential language and communication, Understand perspective, Get the big picture/ Gestalt processing, and using Humour and Human relatedness. Session 1: Looking Equals Thinking- Participants were taught that what one is looking at, represents what that person is thinking about. Session 2: Expected vs. Unexpected – our behaviors have consequences. Session 3: Whole Body Listening- listening involves eyes, shoulders, hands, feet, etc. Session 4: Social Files- we store information about others in our brains that we can use for initiating social interactions. Session 5: Knowledge and Opinion- What to keep in and let out- filtering verbal behavior.

Gutstein et al., 2007.	Treatment Model: RDI cognitive-developmental parent-training model. Addresses perceptual, cognitive and emotional difficulties of individuals on the autism spectrum by training parents to be agents of change for child. Parents meet regularly with therapist. Meetings cover progress updates, goal setting, program planning, and review of videotaped segments of caregivers working with the child. Parents learn to how to perceive and scaffold opportunities for their child to respond in more flexible, thoughtful ways to novel, challenging and increasingly unpredictable settings and problems.

Appendix I

Table Comparing the Research Articles on Findings

Study	Summary of Findings
Anxiety Studies	
Cardaciotto & Hebert, 2004.	No longer met criteria for SAD. Decrease in symptoms. Increase in social functioning. Increase in coping skills for dealing with anxiety-provoking situations. Maintenance of treatment gains at 2-month follow-up.
Chalfant et al., 2007.	Significant reduction in the number of anxiety disorders across both groups. Significantly smaller number of anxiety diagnoses in CBT group. Reduction in internalizing thoughts about worries and self-esteem in both groups. Significantly less internalizing thoughts about anxiety and self-esteem (CATS) in CBT group than WL. Significant reductions in anxiety (RCMAS) in CBT group compared to no reduction in WL. Reduction of self-reported anxiety (SCAS) across groups with a significantly greater reduction for CBT group. Parent Reports: CBT children had fewer anxiety symptoms than WL children (SCAS-P) Significant reductions in emotional difficulties (SDQ) compared to no change for WL, and a significant difference between groups. Teachers reported less emotional difficulties (SDQ) for children in CBT than WL
Lehmkuhl et al., 2008.	Scores were within normal limits. Treatment gains were maintained at 3-month follow-up.
Ooi et al., 2008.	Non-significant reductions in levels of anxiety according to self- and teacher reports. Low –level of agreement between parent and child-ratings. Parent reported higher levels of anxiety, but a trend toward reductions in social phobia and obsessive-compulsive tendencies. Parents reported significantly lower levels of stress. Non-significant reductions in teachers stress

Reaven & Hepburn, 2003.	65 % decrease in symptoms on CY-BOCS, Self-ratings decreased across all symptoms. Increased ability to self-monitor progress, and self-coach. At follow-up sessions OCD symptoms remained well-controlled.
Sofronoff et al., 2005.	In many cases there was no significant change until six-week follow-up. At six-week follow-up: Reduction in parent-reported anxiety on SCAS-P; Fewer social worries on SWQ-P; Increase in children's ability to generate strategies to deal with anxiety provoking situations on James and the Maths Test. Parent involvement resulted in significantly better outcomes than child-only group.
Sze & Wood, 2007.	No longer met criteria for SAD, GAD, or OCD on ADIS-C/P. Improvements in multiple areas of functioning at home, socially and at school. Able to actively and independently engage in cognitive restructuring. Child established three reciprocal friendships with peers. Able to consciously and systematically suppress discussion of special interests in the presence of others.
Sze & Wood, 2008.	No longer met criteria for SoP or GAD on ADIS-C/P. Anxiety symptoms were "very much improved" on CGI-I. Diagnosis-free profile maintained at 3-month follow-up. Qualitative report: No longer avoiding anxious situations, using coping skills in anxious situations, positive changes in overall functioning. MASC: Went from clinically significant scores on Physical Symptoms, Social Anxiety and Separation Anxiety subscales at pre-treatment to normal range at post-treatment on all scales. Parent version reported similar reductions to normal range. CBCL: Level of competence on academic subscale improved from borderline clinical range to within normal range and remained normal at follow-up. SSRS: Increases in social skills from fewer than average, to average at post-treatment and follow-up. VABS showed improvement across all domains of daily living skills, from low to adequate for his age group.
Anger Management	

Sofronoff et al., 2007.	Significant decrease in episodes of anger from baseline. Significant increase in parent confidence in managing child anger. Significant increase in number of effective anger management strategies generated. Significant decrease in frustration levels on ChIA-P. Some generalization of strategies to home and school environments. Gains maintained at 6-week follow-up.
Social Functioning	
Bauminger, 2002.	Significant increase in providing relevant solutions to social situations. Children were more likely to initiate and respond positively to their peers and less likely to initiate repetitive ritualistic autistic behaviors. Generalized skills to social situations and peers not related to treatment. Children provided more examples of complex emotions. Teachers reported higher social skills scores on cooperation and assertion.
Bauminger, 2007a.	Improvements in social cognition and positive dyadic interactions. Decrease in low-level social interaction behavior. Teacher report: increased cooperation, self-control and assertiveness. No change in perceived self-concept or loneliness feelings. Gains maintained at 4-month follow-up.
Bauminger, 2007b.	Children showed an increased ability in mutual planning, cooperation abilities, and the ability to share; and better recognition of basic and complex emotions Results did not generalize to spontaneous interactions outside the treatment setting
Beaumont & Sofronoff, 2008.	Clinically significant improvements in social functioning. Significant improvements in emotion recognition. Significant improvement in knowledge of anxiety- and anger-management strategies. Treatment gains maintained at 6- week and 5-month follow-up.
Crooke et al., 2007.	Significant group changes were found between pre- and post-measures on both expected (socially appropriate) and unexpected (socially inappropriate) behaviors. Individuals showed increases in expected behaviors and decreases in unexpected behaviors.

Gutstein et al., 2007.	No child met criteria for autism at follow-up

Appendix J

Table Comparing the Research Articles on the CBT Treatment Components of Emotion Recognition, Body Awareness, Cognitive Awareness, and Use of Homework

Study	Emotion recognition	Body awareness and management	Cognitive awareness and management	Homework and practice
Anxiety Studies				
Cardaciotto & Hebert, 2004.			X	X
Chalfant et al., 2007.	X	X	X	X
Lehmkuhl et al., 2008.	X	X	X	X
Ooi et al., 2008.	X	X	X	
Reaven & Hepburn, 2003.	X	X	X	X
Sofronoff et al., 2005.	X	X	X	X
Sze & Wood, 2007.	X		X	X
Sze & Wood, 2008.	X		X	X
Anger Management				
Sofronoff et al. 2007.	X	X	X	X
Social Functioning				
Bauminger, 2002.	X	X	X	X

Bauminger, 2007a.	X	X	X	X
Bauminger, 2007b.	X	X	X	X
Beaumont & Sofronoff, 2008.	X	X	X	X
Crooke et al., 2007.	X	X	X	
Gutstein et al., 2007.	X		X	

Appendix K

Table Comparing the Research Articles on the Treatment Components of Problem-Solving Skills, Coping or Social Skills, and Parent Involvement

Study	Problem-solving skills	Coping skills/or social skills training	Parent Involvement
Anxiety Studies			
Cardaciotto & Hebert, 2004.		X	
Chalfant et al., 2007.		X	X
Lehmkuhl et al., 2008.		X	X
Ooi et al., 2008.	X	X	
Reaven & Hepburn, 2003.		X	X
Sofronoff et al., 2005.		X	X
Sze & Wood, 2007.	X	X	X
Sze & Wood, 2008.		X	X
Anger Management			
Sofronoff et al. 2007.		X	X
Social Functioning			
Bauminger, 2002.	X	X	X
Bauminger, 2007a.	X	X	X
Bauminger, 2007b.	X	X	
Beaumont & Sofronoff, 2008.	X	X	X

Crooke et al., 2007.	X	
Gutstein et al., 2007.	X	X

Appendix L

Table Comparing the Research Articles on the Treatment Components of Visual Strategies and Metaphors

Study	Visual Strategies Used	Metaphors Used
Anxiety Studies		
Cardaciotto & Hebert, 2004.	No information given	
Chalfant et al., 2007.	Structured worksheets, lists	
Lehmkuhl et al., 2008.	Thought records, behavior chart	Beating OCD, not letting OCD be the boss
Ooi et al., 2008.	Visual cues, social stories	
Reaven & Hepburn, 2003.	Visual structure, written, schedule, draw symptoms, score sheets, cardboard cutouts of coping tools, social stories, comic strip conversations	Beating OCD, fight on team against OCD, toolbox of tools
Sofronoff et al., 2005.	Workbooks and materials, social stories, comic strip conversations, emotion thermometer	Child as scientist or astronaut exploring new planet, toolbox with tools to fix the feeling, antidote to poisonous thoughts
Sze & Wood, 2007.	Role-plays and visual materials, draw scenarios featuring cartoon characters, draw thought bubbles on the cartoons and write in responses, visual feelings thermometer, bracelet self-monitoring strategy	Fight back against autism an anxiety, what would Harrison Ford do

Sze & Wood, 2008.	Role-modeling, reward chart, cartooning, writing and thought bubbles	Develop a thicker skin, superfriend rules, keeping my cool at school, use of special interests as metaphor
Anger Management		
Sofronoff et al. 2007.	See Sofronoff et al., 2005	See Sofronoff et al., 2005
Social Functioning		
Bauminger, 2002.	No information given	
Bauminger, 2007a.	No information given	
Bauminger, 2007b.	No information given	
Beaumont & Sofronoff, 2008.	Computer game, code cards, secret agent journal, posters, modeling, role-play board game, star chart, emotionmeter, hand signals, comic strip conversations	Junior detective, secret agent, missions, relaxation gadgets
Crooke et al., 2007.	Visual strategies used but details not specified	Social spies, brain files
Gutstein et al., 2007.	No information given	