ASSESSMENT AND TRAINING OF METACOGNITION IN AUTISM SPECTRUM DISORDER

by

Laura Rachel Goodman

Submitted in partial fulfilment of the requirements
for the degree of Doctor of Philosophy

at

Dalhousie University
Halifax, Nova Scotia
June 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Cognitive differences, including deficits in executive functioning and detail-focused processing, are common in high functioning individuals with Autism Spectrum Disorder (ASD). There is also growing evidence that self-awareness is an area of particular difficulty for those with ASD; this is problematic as self-awareness is important for self-advocacy, daily functioning, and treatment outcomes. Despite its importance, there are no assessment tools for self-awareness in ASD, nor is self-awareness targeted for intervention. This dissertation involved three studies. The first two studies were undertaken to develop a measure that assessed metacognition in ASD (i.e., Awareness of Cognitions Questionnaire). The third study involved the development, piloting, and assessment of a metacognitive training program for adolescents with ASD. Study 1, an exploratory factor analysis of the ACQ, found the questionnaire to have four factors and satisfactory internal reliability. In Study 2 youth with ASD and typically developing (TD) participants, and a parent for each, completed the ACQ. Parents of ASD youth reported more cognitive biases in their children than parents in the TD group. Youth with ASD reported fewer biases than their parents attributed to them, whereas TD participants and their parents showed the opposite results. Results provided preliminary validation of the ACQ and demonstrated deficits in self-awareness of cognitive differences in ASD participants. Study 3 included the development and evaluation of a metacognitive training (MCT) program. Two groups of four males with ASD completed the seven-week MCT program, as well as program evaluation measures administered in a time series design. Both visual inspection of data and thematic analysis were used. Overall, both participants and their parents rated MCT favourably. Post-MCT, many of the youth were able to articulate what they had learned in the group and why the information is important for self-advocacy. There were no systematic changes (positive or negative) on quantitative measures of self-esteem, depression, or metacognition. The positive appraisal of the intervention and lack of adverse effects suggest further investigation of MCT is warranted. Overall, these data highlight the deficits in metacognition in youth with ASD and the potential benefits of a novel intervention to target these deficits.

LIST OF ABBREVIATIONS USED

ACQ	Awareness of Cognitions Questionnaire
ADHD	Attention Deficit Hyperactivity Disorder
ADOS	Autism Diagnostic Observation Schedule
ANOVA	Analysis of Variance
ASD	Autism Spectrum Disorder
AQ	Autism Quotient
BAP	Broader Autism Phenotype
BRIEF	Behavior Rating Inventory of Executive Functioning
CELF-IV	Clinical Evaluation of Language Fundamentals, Fourth Edition
DSM-V	Diagnostic Statistical Manual –5th edition
EF	Executive Functions/Executive Functioning
EFA	Exploratory Factor Analysis
EQ	Empathy Quotient
FIQ	Full Scale Intelligence Quotient
HAP	Happiness and Satisfaction Subscale
KT	Knowledge Translation
MAP	Minimum Average Partial
MCT	Metacognitive Therapy/Training
MI	Motivational Interviewing
MSA	Measures of Sampling Adequacy
OCD	Obsessive Compulsive Disorder
PCA	Principal Components Analysis
PDD-NOS	Pervasive Developmental Disorder – Not Otherwise Specified
PHCSCS-2	Piers-Harris Children's Self-Concept Scale, Second Edition
PIQ	Performance Intelligence Quotient
PTSD	Post Traumatic Stress Disorder
SRS	Social Responsiveness Scale
TD	Typically Developing
VIQ	Verbal Intelligence Quotient

ACKNOWLEDGEMENTS

I am very grateful to have been mentored by a host of brilliant women who have nurtured my academic growth and have supported me throughout my post-secondary education. To my supervisor, Dr. Shannon Johnson, thank you for your willingness to take a chance on a young, hopeful graduate student and see me through this six-year journey. As well, I extend my unending gratitude to Dr. Beth Kelley (my honour's supervisor) and Drs. Isabel Smith and Joan Backman (my comprehensive project supervisors). I am also fortunate to have had an excellent dissertation committee and it was a pleasure sharing my defence, a very proud moment, with Drs. Penny Corkum and Gail Eskes and my external examiner, Dr. Susan White.

I also sincerely thank my clinical supervisors at the IWK Health Centre, Dalhousie Counselling and Psychological Services, and the Children's Hospital of Eastern Ontario for having profoundly influenced my training and career path.

I have had wonderful lab mates throughout my years in the Johnson Lab as well as the most amazing cohort of fellow graduate students. Thank you for being my problem-solvers, cheerleaders, confidantes, and friends. You made Halifax my home away from home.

To both my given and chosen family members, I am indebted to you for the years of constant encouragement, support, and guidance. I am thankful for the unconditional love of my parents and sisters as well as the exceptional kindness of those friends who have become cherished members of my extended family.

And finally, thank you to the extraordinary youth and families with ASD who were integral to the body of work that follows.

CHAPTER 1: INTRODUCTION

The Current Studies, In Brief

There is a robust body of research demonstrating cognitive differences in ASD. Cognitive differences refer to atypical cognitive processes or abilities in people with ASD that have been identified through previous research. They are referred to as cognitive differences, rather than deficits, because they differ from the cognitive abilities of typically developing comparison participants and in some cases are superior abilities. Three well-established areas of cognitive difference are the focus of this dissertation: poor executive functioning, detail-focused processing, and deficits in self-awareness. These differences are often overlooked when providing intervention to youth with ASD. Moreover, many of the interventions available are designed for preschool and young school-aged children with ASD and as such, there are inadequate services available for older children, adolescents, and adults.

There are several reasons to believe that increasing self-awareness of cognitive differences may be a fruitful area for intervention research. Firstly, it is well established that impairments in executive functioning and detail-focused processing interfere with everyday life for individuals with ASD, including learning, school engagement, and communication and social skills (e.g., Brown & Bebko, 2012; Endedijk, Denessen, & Hendriks, 2011; Gilloty, Kenworthy, Sirian, Black, David, Wagner, & Ann, 2002; Jahromi, Bryce, & Swanson, 2013; Koldewyn, Jiang, Weigelt, & Kanwisher, 2013). Secondly, a large amount of research has established that youth on the autism spectrum have a lack of awareness in regard to their own ASD symptomatology including social skills, empathy, and ASD-related traits (e.g., Green, Gilchrist, Burton, & Cox, 2000;

Johnson, Filliter, & Murphy, 2009; Koning & Magill-Evans, 2001; Knott, Dunlop, & Mackay, 2006; Lerner, Calhoun, Mikami, & De Los Reyes, 2012). Poor awareness of one's own symptoms has been found to interfere with functioning and treatment outcomes for individuals with schizophrenia, Alzheimer's disease, attention deficit hyperactivity disorder and obsessive compulsive disorder (e.g., Garcia et al., 2010; Harwood, Sultzer, & Wheatley, 2000; Himle, Etten, Janeck, & Fischer, 2006; Lewin et al., 2010; Mikami, Calhoun, & Abikoff, 2010; Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007; Perivoliotis et al., 2010; Schwartz, 1998; Storch et al., 2008). Lastly, an intervention aimed at increasing awareness of cognitive differences and helping individuals in recognizing their strengths and challenges has been successfully established for people with schizophrenia (e.g., Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010; Moritz et al., 2011). This raises interesting questions about the feasibility to develop a similar approach for people with ASD.

In the current research project, our goals were to develop a measure to assess metacognition in ASD (i.e., *Chapter 2: The Awareness of Cognitions Questionnaire*) and then develop, pilot, and assess a metacognitive training program for high functioning adolescents with ASD (i.e., *Chapter 3: Metacognitive Training)*. This chapter will elaborate on the rationale for the current studies by reviewing the relevant literature, including a) an overview of ASD, b) cognitive differences in ASD, c) awareness of symptoms, d) self-advocacy, and e) metacognitive training. At the end of this chapter, the research questions and hypotheses will be described.

Overview of Autism Spectrum Disorder

Autism spectrum disorder (ASD) is characterized by impairments in social interaction and communication as well as repetitive and stereotyped patterns of behaviours and interests (American Psychiatric Association, 2013). ASD encompasses the previously used (i.e., DSM-IV-TR) diagnostic labels of autistic disorder, Asperger's disorder/Asperger's syndrome, and pervasive developmental disorder - not otherwise specified; of note, DSM-IV diagnostic labels were used for recruitment in the studies that follow because participants were diagnosed prior to 2013. The best estimate of ASD prevalence is approximately 1% and this rate has significantly increased over time due to factors such as changes in diagnostic criteria, referral patterns and available services, public awareness, and decreased age of diagnosis (Fombonne, Quirke, & Hagen, 2011). Early warning signs can include delayed language (i.e., expressive and receptive language), poor social communication (i.e., atypical eye gaze, lack of joint attention, social orienting, and social smiling, as well as a lack of orienting to name), and/or other atypicalities (e.g., difficulties with emotional regulation, play, imitation); these symptoms are often observable within the first two years of life (Zwaigenbaum, 2011). While most commonly diagnosed in childhood, ASD is a life-long neurodevelopmental condition and long-term follow-up research shows that there is considerable variability in adult outcomes. Some people with ASD lead relatively independent lives while others continue to require intensive support (Farley et al., 2009). However, even for those considered more 'independent', the jobs they obtain are often unstable and of low status and as such, many adults with ASD continue to live with their parents (Farley et al., 2009; Levy & Perry, 2011). Therefore, there is a pressing need for improved support, training, and intervention for adolescents and adults with ASD so that these individuals can reach their full potential and have improved quality of life.

Heterogeneity is common in the phenotypic presentation of ASD. The expression and severity of symptoms vary across individuals, as well as vary within the same individual over time and settings (Hill & Frith, 2003). Individuals with ASD vary in cognitive ability, communication and social skills, adaptive behaviour and comorbid genetic, neurological, and psychiatric disorders. Intellectual disability is the most common comorbid diagnosis, affecting approximately two thirds of those on the autism spectrum (Dykens & Lense, 2011; Isaksen et al., 2013, Matson and Kozlowski, 2011; Mandell et al., 2012) and is a strong predictor of poor prognosis (Matson & Shoemaker, 2009). However, for many people with ASD, life is complicated by more than just intellectual ability. For people on the autism spectrum with average to above average intelligence, common difficulties include significant challenges with practical daily living skills and/or comorbid psychiatric disorders. Approximately half of adults with ASD have at least one comorbid psychiatric disorder such as depression or anxiety and adaptive behaviour profiles vary greatly between individuals (Farley et al., 2009).

There has been a significant amount of research investigating treatment options for those with ASD. The most researched interventions for ASD fall under the umbrella term of Early Intensive Behavioural Intervention (EIBI), which are time intensive interventions, aimed at young children, which target core aspects of ASD (e.g., social-communication and behavioural skills, which include verbal language, play, adaptive vs. disruptive behaviours), and are based on the principles of applied behaviour analysis. Despite their commonalities, there are many different intervention models that fall under the EIBI umbrella (e.g., Lovaas, Pivotal Response Training, TEACCH), all of which have their own unique characteristics and efficacy data (Rogers & Vismara, 2008). Many outcome measures are often used to assess the efficacy of EIBI, and overall EIBI has been shown to result in both short- and long-term improvements in language, IQ, and adaptive behaviour and reduction in severity of autism symptoms and behavioural problems (Reichow, 2012; Rogers & Vismara, 2008). In a review of five meta-analyses of EIBI conducted since 2009, the author concluded that EIBI has the greatest amount of empirical support in comparison to other treatment models and needs to be given the utmost consideration when weighing treatment options for children with ASD (Reichow, 2012). However, many of these interventions are only available to, and appropriate for, preschoolers and young school age children. In contrast, there are currently limited services available for older children, adolescents, and adults. While it is promising that ASD intervention research continues to flourish, more needs to be done in order to better serve people with ASD throughout their lives, including developing novel interventions modeled after successful approaches previously researched in other clinical populations (i.e., the current study).

Cognitive Differences in ASD

Overview. Cognitive processing differences have been the topic of much ASD research and many areas of cognition have been examined. As would be expected in a heterogeneous population, there is a great deal of variability in the results of such studies. The accumulation of research in this area over the years has led to consensus that there are at least three primary areas of difference between people with ASD and those who are typically developing: social cognition, executive functioning, and detailed-focused processing. For the purposes of the current study, we focused only on the latter two. We chose this focus because aspects of social cognition are already targeted in existing social skills interventions. For example, Let's Face It (Tanaka et al., 2010) targets face-processing skills (i.e., identity and emotion recognition). Moreover, there are already reliable and valid questionnaire measures of social cognition available, such as the Empathizing Quotient (Baron-Cohen & Wheelwright, 2004), which assess the ability to perceive and respond to others' emotions and behaviours.

There is substantial evidence that high functioning individuals with ASD demonstrate deficits in executive functioning and detailed-focused processing, both of which will be described in detail below.

Executive Functioning. Although not considered a 'core' symptom of ASD, there is a wealth of research suggesting that many high functioning individuals on the spectrum perform significantly below average on tasks of executive functioning (EF; e.g., Hill, 2004; Pennington & Ozonoff, 1996; Russo et al., 2007). EF is a multifaceted and fractionated construct that includes (but is not limited to) planning and organization, initiation, problem solving, mental flexibility, inhibitory control, and working memory (see Jurado & Rosselli, 2007 for review). Additionally, Jurado and Rosselli articulately encapsulate the importance of EF:

> In a constantly changing environment, executive abilities allow us to shift our mindset quickly and adapt to diverse situations while at the same time inhibiting inappropriate behaviors. They enable us to create a plan, initiate its execution, and persevere on the task at hand until its completion. Executive functions mediate the

> ability to organize our thoughts in a goal-directed way and are therefore essential for success in school and work situations, as well as everyday living. (p. 214)

There are a number of standardized neuropsychological tests that are widely used in both the clinical and research arenas to assess EF. Commonly used tests include the Wisconsin card sorting test, Tower of London/Hanoi, Trail Making Test, Stroop, Verbal Fluency Tasks, Negative Priming, tests Intradimensional–extradimensional shift tests, and Go/No-Go tasks. However, these tasks are not without methodological limitations. For example, these tasks have a number of measurement issues, including that they (1) often tap into multiple EF processes that cannot be disentangled, (2) rely on both EF and non-EF processes, (3) use cumulative/endpoint scores that do not measure the active processes of reasoning, problem-solving, planning, etc., and (4) have questionable ecological validity. As such, people often perform inconsistently (i.e., low correlations amongst EF tasks and dissociations in performance) when assessed with a battery of several EF measures (Jurado & Rosselli, 2007).

Despite measurement issues, there is convincing evidence that high functioning individuals with ASD have deficits in a number of areas of EF. Specifically, robust findings indicate deficits in planning/organization (as measured by Tower tasks) and mental flexibility (as measured by Intradimensional–extradimensional shift tasks, and the Wisconsin Card Sorting Test). Evidence is mixed regarding working memory (span and interference tasks) and inhibition (Stroop, Stop-Signal), suggesting less consistent areas of impairment (see Hill, 2004; O'Hearn, Asato, Ordaz, & Luna, 2008; Russo et al., 2007 for reviews). Poor performance on EF tasks is especially prevalent when people with ASD are asked to complete less structured, more 'open-ended' tasks that assess planning, abstract problem solving and multitasking, such as the Key Search task and the Six Parts/Six Elements test (see White, Burgess, & Hill, 2009 for descriptions of these tasks). These types of tasks are being used more commonly as researchers attempt to develop more sensitive and ecologically valid measures of EF (Hill & Bird, 2006; White, Burgess, & Hill, 2009). Due to the plethora of tools to assess executive functioning and the multifaceted nature of the construct itself, our knowledge of EF in ASD is still evolving. However, the majority of research suggests that for individuals with ASD, EF appears to be “less sophisticated and flexible” (O’Hearn et al., 2008; p. 1124).

Executive functioning deficits identified in research studies also have real-world consequences. In both typical development and research from clinical populations, EF has been shown to predict adaptive and maladaptive behaviours across childhood and adolescence and is closely linked to critical cognitive systems such as Theory of Mind and processing of reward signals (Hughes, 2011). Moreover, research is starting to highlight a relationship between deficits in EF in ASD and poor adaptive functioning in many areas of everyday life, including the degree of homework difficulty, school engagement, and communication and social skills (e.g., Endedijk, Denessen, & Hendriks, 2011; Gilloty, Kenworthy, Sirian, Black, David, & Wagner, Ann, 2002; Jahromi, Bryce, & Swanson, 2013). Further, the EF deficits common in ASD can be particularly problematic for older youth and adolescents because there are increased demands for skills such as organization, planning, and working memory in high school; this is because secondary school often involves having multiple teachers, long-term assignments, and cumulative exams (Rosenthal et al., 2013).

Detail-Focused Processing. Another processing difference observed in ASD is an atypical preoccupation with features of objects and specific details of information. This heightened attention to detail was first noted by Leo Kanner (1943) in his original description of autism, specifically when he described how people with ASD demonstrate a need for sameness because of their intense focus on detail at the expense of experiencing the whole. He explained that for people with ASD, because of this attention to detail, “[a] situation, a performance, a sentence is not regarded as complete if it is not made up of exactly the same elements that were present at the time the child was first confronted with it” (p. 246). Conversely, typically developing individuals demonstrate global precedence; specifically, they are faster and make fewer errors when processing global information vs. local information (see Kimchi, 1992 for a review). This ability to attend to and subsequently integrate details into a gestalt, or meaningful whole, is called central coherence. Central coherence has traditionally been assessed using tasks such as embedded figures (Witkin, Oltman, Raskin, & Karp, 1971), sentence completion (Happé, Briskman, & Frith, 2001), homographic reading, block design, Navon-type hierarchical shapes tasks, visual illusions, and visual search, as well as many experimental auditory and music-related tasks. These measures examine central coherence at both low-level processing such as perception (auditory and visual) and basic attention, as well as high-level processing such as language.

In the late 1980s, Uta Frith developed a cognitive theory of ASD called ‘weak central coherence’ which proposed that an inability to integrate pieces of information into coherent wholes is the core cognitive deficit in ASD. Frith (1989) argued that people with ASD show an atypical focus on local detail at the expense of extracting global meaning.

More recently, in response to a growing body of evidence suggesting that the tendency for detail-focused processing can be overridden when ASD participants are explicitly instructed to extract global meaning on tasks, weak central coherence theory has been modified. Frith and Happé (2006) now posit that: (1) the failure to extract global meaning is considered secondary to detail-focused processing (i.e., impaired global processing was emphasized in the original theory); (2) weak central coherence is a cognitive style rather than a core deficit; and (3) that weak central coherence should be considered in conjunction with other theories of cognition in ASD.

Just as Frith updated her theory in response to new empirical evidence, other researchers have explored and refined our understanding of global-local processing in ASD. Mottron and Burack (2001) posited an ‘enhanced perceptual functioning’ framework. Their theory stipulates an overdevelopment in ASD of low-level perceptual abilities, which can interfere with - but does not cause a deficit in - high-level or global processing. Similarly, Plaisted (2001) also developed a theory based on perceptual processing. She suggested that individuals with ASD show enhanced discrimination ability and reduced generalization (i.e., they process the distinct features of an object well but have difficulty processing common features amongst objects). Also contributing to the literature, Baron-Cohen (2006) described core strengths in systemizing, that is, the drive for individuals with ASD to construct and analyze systems in an attempt to make predictions about the world; this requires significant attention to detail.

The central coherence research in ASD has been made difficult by both a lack of consensus in the literature regarding the development of local and global processing in typically developing children, as well as flawed assessment tools which cannot adequately separate the two processes (Happé & Booth, 2008). Also confounding the research is the wide age range of participants tested, the phenotypic heterogeneity present in ASD, how test questions are worded/presented, and the vast range of stimuli used to test the various theories (Koldewyn et al., 2013). As such, the precise nature of global-local processing in ASD remains unclear. However, the most consistent finding in the literature is that ASD groups outperform controls when they complete tasks that require local processing (e.g., they are faster and more accurate on measures such as the Embedded Figures Task and Block Design; for a review see Happé & Booth, 2008). Furthermore, when given the choice to report global or local information, children on the autism spectrum are less likely to report global information compared to control participants but can report the global information when specifically instructed to do so (Koldewyn et al., 2013). Therefore, there is currently agreement that superior local processing is likely a default preference for people with ASD or rather, a bias or style of information processing (Happé & Frith, 2006; Mottron, Dawson, Soulières, Hubert, & Burack, 2006).

While attending to detail has clear benefits, there are developmental consequences and real-world repercussions to not extracting the meaning or gist of information. These repercussions are present regardless of the mechanism behind global processing (i.e., a deficit in ability or a preference to attend to local detail). A bias to local-processing has been linked to problems such as over-selectivity and poor generalization and categorization which can cause problems with learning information across different environments and complex stimuli (see Brown & Bebko, 2012). In addition to learning, extracting global meaning is crucial for successfully navigating the social world where people have to integrate information from surroundings (e.g., words, syntax, tone, nonverbal behaviours, etc.; Koldewyn et al., 2013).

Thus, atypical global-local processing, as well as challenges in executive functioning, negatively impact the daily functioning of people with ASD because they impact how these individuals perceive, process, and respond to the world around them. Given the importance of these cognitive differences in the daily lives of those with ASD, it would seem appropriate to address these challenges through targeted intervention.

Awareness of Symptoms in ASD

There is growing evidence that people with ASD also have difficulty with self-awareness, specifically recognition of one's own symptomatology. Of note, in many self-awareness studies, the constructs being measured (e.g., trait, symptom, behaviour, skill, disability, etc.) are often imprecisely defined, used interchangeably, and meant to capture a feature often associated with ASD; this occurs, in part, because ASD is a behaviourally defined and as such, it is hard to tease apart symptoms from traits, behaviours, and/or skills.

Currently, the dominant theoretical position regarding self-awareness and ASD links the ability to recognize thoughts, feelings, and intentions in others to the ability to recognize these in one's self via a common mechanism (Carruthers, 2009; Frith & Happé, 1999; Hobson, 1990; Williams, 2010). Further, Frith and Happé argue that a lack of theory of own mind impacts both social interactions as well as introspection. Moreover, recent longitudinal research has shown that early executive functioning skills may predict a child's future Theory of Mind skills and as such, one could hypothesize that self-awareness deficits result from a primary problem in executive functioning (Pellicano, 2010). Problematically, without self-awareness, it is challenging for individuals with ASD to gain an understanding of their own symptomatology and personal strengths and challenges.

While only peripherally related to insight of symptomatology, there is some important experimental research informing our understanding of self-awareness. In a review of memory and the self, Lind (2010) argues that the impairments seen in autobiographical and episodic memory in ASD suggest that they have impoverished self-concepts compared to typically developing individuals. She also highlights studies that show a diminished self-referencing effect in ASD. Specifically, individuals with ASD do not show the typical increased memory for information that is encoded in relation to the self (e.g., Lombardo, Barnes, Wheelwright, & Baron-Cohen, 2007; Toichi et al., 2002), which further suggests a relationship between self-awareness and memory impairments. However, she notes that the relationship between memory and self-concept may be bidirectional and that other factors may (at least in part) account for impairments in autobiographical and episodic memory. As such, this line of research only begins to shed light on our understanding of self-awareness in ASD.

Furthermore, the memory research is in keeping with other experimental studies of the self in ASD. Individuals on the autism spectrum have been shown to have difficulty in the following processes: retelling personal narratives in a coherent and sophisticated manner; conceptualizing themselves with agency or through another's perceptive; recognizing that they have 'first-person privileged' information regarding their own inner states; detecting/reporting their own false beliefs; demonstrating awareness of their own intentions; and generating self-characteristics (e.g., Farley, López,

& Saunders, 2010; Jackson, Skirrow, & Hare, 2012; Mitchell & O'Keefe, 2008; Losh & Capps, 2003; Williams & Happé, 2009; Williams & Happé, 2010). Moreover, Williams, Lind, and Frith (2009) built upon this research to suggest that a sub-set of self-awareness, metacognition (i.e., thinking about one's own thoughts), is specifically impaired in ASD. In his review article, Williams (2010) concluded that the specific metacognitive deficit in self-awareness in ASD is related to psychological self-knowledge.

In keeping with this hypothesis, in the early to mid 2000s, researchers began to examine self-awareness of ASD symptoms in youth on the autism spectrum. Many of these studies used informant discrepancies (De Los Reyes & Kazdin, 2005) to assess self-awareness; that is, they compared self-reports to reports completed by parents, teachers, and/or researchers. More specifically, participants with ASD are administered questionnaires and/or interviewed to assess their perceptions of their own skills/abilities, behaviours, traits, ASD and mental health symptoms, etc. These same measures are then administered to one or more informants and the results are compared to the self-reports.

For example, on a self-report measure, Green, Gilchrist, Burton, and Cox (2000) found that only 15% of participants with Asperger's syndrome were judged by the interviewer to have a realistic perception of their disability and only 35% of the group could give any description of it at all. Moreover, 50% of their participants with ASD appeared to have no awareness of how others viewed them. In regard to social skills, Koning and Magill-Evans (2001) found that adolescent males with Asperger's syndrome rated their social skills as significantly better than did their parents and teachers. Similar discrepancies in parent vs. self-ratings of social skills were also reported by Knott, Dunlop, and Mackay (2006). More recently, Lerner, Calhoun, Mikami, and De Los Reyes

(2012) found that in three distinct samples of high functioning youth with ASD, parents reported significant deficits in social skills while the youth reported their skill level to be on par with their typically developing peers.

Building upon some of the aforementioned studies, Johnson, Filliter, and Murphy (2009) examined self-awareness in youth with ASD using the Autism Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) and the Empathizing Quotient (EQ; Baron-Cohen & Wheelwright, 2004). As described by Baron-Cohen and colleagues, the AQ parent- and self-report questionnaire assess traits that are associated with the autism spectrum (e.g., social skills, attention switching, attention to detail, imagination) and the EQ assesses the ability to perceive and respond to other's emotions and behaviours. Johnson and collegues compared self- and parent-reports of high functioning youth with ASD and typically developing youth. Both parents and youth in the ASD group reported higher AQ scores (i.e., more ASD traits) relative to the parents and youth in the typically developing group. However, they found that parent- and self-ratings differed significantly within the ASD group on the AQ, while there were no differences between parent- and self-ratings for the typically developing group. More specifically, youth with ASD rated themselves as having fewer autistic features than did their parents, thus suggesting limited awareness of their own autistic traits. A similar pattern of results was found on the EQ. That is, ASD youth reported more empathic traits than their parents attributed to them, whereas the typical youth did not differ from their parents' reports. Therefore, there is evidence to suggest that individuals on the autism spectrum have poor self-awareness in regard to their own ASD symptomatology, including their interpersonal abilities. However, to the best of our knowledge, there has not been a study dedicated to investigating self-awareness of the cognitive traits associated with ASD and as such, this is an important next step in our understanding of self-awareness in ASD.

Research from other clinical populations including schizophrenia, attention deficit hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD) indicates that self-awareness has far reaching implications. For example, a lack of awareness of one's own symptomatology in schizophrenia is associated with poorer medication compliance, increased symptom severity, and poorer psychosocial functioning, treatment outcomes, and prognosis (i.e., increased relapses and hospitalizations; Perivoliotis et al., 2010; Schwartz, 1998). Similarly, OCD patients with adequate (vs. poor) insight as assessed by the Yale-Brown Obsessive-Compulsive Inventory (Y-BOCS; Goodman et al., 1989), experience better gains from exposure and response prevention therapy even after controlling for pre-treatment OCD severity, depression, and medication status; this may be due to a relationship between self-awareness, treatment adherence, and responding to corrective information from therapy (Himle, Etten, Janeck, & Fischer, 2006). These findings have also been replicated in youth with OCD (i.e., those with greater insight are more likely to respond to treatment and have better adaptive functioning; Garcia et al., 2010; Lewin et al., 2010; Storch et al., 2008). In youth with ADHD, there is some evidence to suggest that awareness of deficits may improve motivation to participate in behavioural treatment (see Hoza, & Kaiser, 2007 and Owens, Goldfine, Evangelista for review). Futhermore, Mikami, Calhoun, & Abikoff (2010) found that youth with ADHD who self-reported competence in areas of clear impairment had more conduct problems and poorer response to intervention compared to those with more accurate self-perceptions.

Of particular importance to the current dissertation, Verhoeven et al. (2012) recently found that better self-awareness was associated with better social functioning and parent-reported daily functioning in youth with ASD. These authors wisely note that self-awareness is critical because people need to be aware of their challenges in order to be motivated to improve. The work by Verhoeven et al., as well as the aforementioned OCD, ADHD, and schizophrenia research, highlights an important relationship between self-awareness and intervention outcomes.

An important concern when considering intervention to increase self-awareness in ASD is the potential relationship between awareness of symptoms and depression (e.g., Butzer & Konstantareas, 2003). Endorsement of depressive symptoms is of particular concern for high functioning individuals with ASD. Although there is considerable evidence for poor awareness of various ASD symptoms, there is also evidence that some individuals with ASD are aware of their challenges. Specifically, it has been proposed that individuals on the spectrum with average to above average cognitive abilities are somewhat able to recognize their poor social competency, social isolation/rejection and attribute their social failures to personal deficits (e.g., Barnhill, 2001; Capps, Sigman, & Yirmiya, 1995; Sterling Dawson, Estes, & Greenson, 2008). In the study described above, Johnson et al. (2009) found that even though parent- and self-ratings differed significantly within the ASD group, youth with ASD still rated themselves as having more autistic traits than did typical participants. This suggests that high functioning individuals on the autism spectrum have some (albeit limited) self-awareness. Williamson, Craig, and Slinger (2008) found that youth with ASD perceived themselves as less socially competent and having less peer approval than typical children; problematically, many of their participants with ASD also placed significant importance on peer and parental approval and this approval (or lack thereof) was predictive of depressive symptoms. Moreover, Vickerstaff, Heriot, Wong, Lopes, and Dossetor (2007) found that higher IQ predicted lower levels of self-perceived social competence, which in turn predicted higher levels of depressive symptoms. White and Roberson-Nay (2009) found that youth with ASD who reported more social loneliness also reported higher levels of anxiety. This is particularly problematic as comorbid mental health disorders such as anxiety and depressive disorders are a significant concern in ASD (Farley et al., 2009; Matson & Nebel-Schwalm, 2007). Therefore, while targeting self-awareness for intervention in ASD may be beneficial, it will be critical to carefully monitor the effects of this increased awareness and utilize approaches that will limit the likelihood of increased comorbid psychopathology.

Self-Advocacy

Self-awareness is also closely related to the concept of self-advocacy. Self-advocacy can be defined as the combination of knowledge of one’s self and one’s rights and skills in effective communication and leadership, which are utilized to meet personal and/or collective goals and needs (Test, Fowler, Wood, Brewer, & Eddy, 2005). Despite decades since the de-institutionalization movement, families, teachers, and clinicians often make major life decisions for people with disabilities (Algozzine, Browder, Karvonen, Test, & Wood, 2001), and research suggests that people with disabilities commonly report difficulty gaining independence, especially from their parents (Caldwell, 2000). In their conceptual framework of self-advocacy, Test and colleugues

(2005) note that “a first step toward self-advocacy is to gain knowledge of one’s own interests, preferences, strengths, needs, learning style, and attributes of one’s disability” (p. 50). Therefore, it can be hypothesized that being aware of one’s own cognitive differences, could be critical to self-advocacy for people with ASD.

In conjunction with the growing disability social rights movement, researchers have been examining the impact of community-based self-advocacy groups. Participants of the these advocacy groups self-report benefits including: an increased ability to speak up and defend oneself; a new support system and relationships; the building of a positive disability identity; the opportunity to learn leadership skills; and a greater sense of self-esteem, empowerment, status, and confidence (Beart, Hardy, & Buchan, 2004; Caldwell, 2010; Field, Sarver, & Shaw, 2003; Gilmartin & Slevin, 2010; Mcnally, 2003). Furthermore, one of the most important benefits of membership in a self-advocacy group is a positive change in self-concept (Goodley, 2000).

Based on a review of the literature, Test and colleagues (2005) concluded that the ability of individuals with disabilities to advocate for themselves is critical for successful periods of transition (e.g., from adolescence and school to adulthood and the workforce). They cautioned, however, that individuals with disabilities require training in self-advocacy skills, which is frequently unavailable. The few self-advocacy interventions available are mainly for adolescents and adults with mild intellectual disabilities or learning disabilities (Algozzine et al., 2001). The lack of self-advocacy training becomes especially problematic when students leave the supportive school environment and cannot communicate their strengths and needs in their adult lives (Izzo & Lamb, 2003). As such, researchers suggest that self-advocacy skills should be explicitly included in the

Individualized Education Program plans for students with disabilities, especially for transition planning (Malian & Nevin, 2002).

There are only three studies that have specifically examined self-advocacy in a youth ASD sample. The research that has been conducted suggests that self-advocacy skills significantly predict whether a student on the autism spectrum will participate in his/her own Individualized Education Program planning (Barnard-Brak & Fearon, 2012). However, Townson and collegues (2007) found that individuals with ASD have a lack of access to and little awareness of advocacy groups despite an interest in developing knowledge and skills. They also found that individuals who do access disability advocacy groups have difficulty fitting in and can be hindered by the social and communication aspects of the group setting. As such, it is evident that more research regarding self-advocacy and ASD is needed and that self-advocacy training and interventions should be tailored to meet the unique needs of people with ASD.

The Development of Metacognitive Therapy

Adrian Wells and colleagues developed an intervention model that targets metacognition; more specifically, they developed a metacognitive model of emotional disorders and an associated therapy. Wells (2007) posits that there are both positive and negative metacognitive beliefs that are critical in the development and maintenance of psychiatric disorders and as such, need to be targeted in intervention. Positive metacognitive beliefs revolve around the usefulness of worrying, for example, ‘if I worry, I’ll be prepared for the worst’. Negative metacognitive beliefs revolve around worry being uncontrollable and harmful for physical and mental health, for example, ‘worrying will make me go crazy’. For a review of how metacognitive beliefs are related to general anxiety disorder and social phobia see Wells (2007). Metacognitive beliefs are problematic because, in vulnerable individuals, they exacerbate negative thinking, increase threat monitoring and rumination, and have a negative impact on coping (Wells & Matthews, 1994, 1996). Therefore, Wells' metacognitive therapy (MCT) focuses on modifying patients' metacognitive beliefs using psychoeducation and interactive activities. Whereas cognitive behavioural therapy teaches individuals how to challenge the content of their thoughts (e.g. "I may have left the stove on and my home will burn down"), MCT teaches people that their more general metacognitive beliefs (e.g., worry is uncontrollable) are maladaptive (Wells, 2000, 2007, 2009). While Wells developed this theoretical metacognitive intervention model, the specific format of MCT (i.e., number of sessions, individual vs. group, inclusion criteria for therapy) differs greatly depending on the goals of the clinician and/or researchers utilizing the model.

Since the mid-1990s, MCT has been successfully adapted for various anxiety disorders, in particular general anxiety disorder, OCD, and post-traumatic stress disorder (PTSD; e.g., Rees & Van Koesveld, 2008; Van der Heiden, Muris, & van der Molen, 2012; Wells & Colbear, 2012). A recent randomized control trial for patients with generalized anxiety disorder found that MCT significantly reduced symptoms compared to an intolerance-of-uncertainty therapy and delayed therapy group, so much so that 91% of patients in the MCT group no longer fulfilled the diagnostic criteria for the disorder (effect sizes ranged between $d = 1.15$ to 2.39 for the various outcome measures; Van der Heiden et al., 2012). Promising results have also been found in preliminary studies of MCT for PTSD. This research suggests that MCT is likely effective in a brief format for patients with PTSD, even though it does not include more traditional treatment aspects such as exposure to or challenging of traumatic memories (Wells & Colbear, 2012).

In the OCD literature, researchers are specifically interested in providing metacognitive therapy for individuals who are unable or unwilling to attend therapy, a significant challenge for clinicians working with this population (Rees & Van Koesveld, 2008). For example, Moritz and colleagues developed an online 14- section, self-help manual entitled “My Metacognitive Training for OCD (myMCT)” that targets cognitive biases common in OCD (e.g., inflated responsibility, over importance of thoughts, excessive concern about the importance of controlling one's thoughts, overestimation of threat, intolerance of uncertainty, and perfectionism). They subsequently assigned 86 patients with OCD to a treatment or wait-list control group via the Internet. The myMCT group showed a greater reduction in symptoms (i.e., d =.63 as measured by the Y-BOCS total score compared with the waitlist group) and ratings of the treatment manual were favorable (Moritz, Jelinek, Hauschildt, & Naber, 2010). Rees and Van Koesveld (2008) also expressed concerns about treatment delivery in patients with OCD; however, they advocated for a more traditional therapeutic model (i.e., group therapy). They explain that MCT is particularly well suited to group therapy. In addition to the typical benefits of group therapy (e.g., cost and wait-list reduction and the experience of normalization, peer modeling, peer support), they also argue that group MCT “…is applicable to all subtypes of OCD because it focuses on thinking processes as opposed to content” (p. 452). Preliminary investigation of the efficacy of group MCT for patients with OCD is also quite positive (d = 2.28 on the Y-BOCS and d = 1.51 on a measure of anxiety-related metacognitions) and supports the need for additional research in this area (e.g., Rees & Van Koesveld, 2008).

Moreover, MCT has also been used to treat recurrent, persistent, and treatment-resistant depression. Wells and colleagues began studying the efficacy of MCT for depression with the hope that focusing treatment on metacognitive beliefs would help decrease the prevalence of relapse (Wells et al., 2009). In a preliminary, non-concurrent multiple-baseline study, four patients underwent six to eight MCT sessions. The researchers found that MCT was associated with clinically significant improvements in depressive symptoms, rumination, and metacognitive beliefs (Wells et al., 2009). In a more recent study, Wells et al. (2012) also found statistically significant improvements in depression symptoms, rumination, and metacognition for depressed participants and these gains were maintained over 6 and 12-month follow-ups. It is evident that the novel work by Adrian Wells and colleagues has sparked a growing body of research that has important implications for the treatment of mental health disorders.

Metacognitive Training for Schizophrenia

Moritz, Woodward and the Metacognitive Study Group built upon Wells' research to develop a group therapy for patients with schizophrenia. Individuals with schizophrenia are known to demonstrate significant cognitive biases and these biases are thought to contribute to and maintain delusions (Moritz & Woodward, 2007a). Research suggests that there are several cognitive biases related to the positive symptoms in schizophrenia including: jumping to conclusions and a bias against disconfirmatory evidence; an externalizing bias for negative events (i.e., scapegoating); Theory of Mind difficulties; and metamemory biases (e.g. lack of vividness of memories and overconfidence in errors). For a review of the cognitive biases present in schizophrenia see Bell, Halligan, & Ellis, 2006; Moritz, Vitzthum, Randjbar, Veckenstedt, & Woodward, 2010; and Freeman, 2007. Moritz and Woodward described the goals of their metacognitive training program as follows: "transfer knowledge of cognitive biases obtained from basic research to people diagnosed with schizophrenia, and to provide corrective experiences to patients, with the hope that it will facilitate symptom reduction and act prophylactically against relapse" (Moritz & Woodward, 2007a, p. 619).

Currently, the most common and well-established psychological intervention used to treat symptoms for schizophrenia is cognitive behavioural therapy (CBT; Wykes, Steel, Everitt, & Tarrier, 2008). CBT and group-based MCT are complimentary in nature and both are based in a similar body of literature regarding the importance of targeting cognitions. However unlike CBT, MCT uses a 'backdoor' approach; that is, it does not challenge patients' specific delusions but rather teaches patients about the cognitive processes related to delusions with the goals of decreasing participant dropout and facilitating knowledge translation (Moritz & Woodward, 2007b). If patients are in need of more individualized therapy and are willing to accept such treatment, MCT can be used in conjunction with individual CBT or be delivered in an individualized format (i.e., MCT+; Moritz, Veckenstedt, Randjbar, & Vitzthum, 2010).

Moritz and Woodward's MCT program comprises eight sessions (one cycle), each 45-60 minutes in length, ideally administered twice per week. Participants are encouraged to attend two cycles and the group has an open format (i.e., participants can begin the group at any session). Each cycle highlights parallel themes and the material is taught using psychoeducation, exercises designed to target specific cognitive biases, discussion of real-world examples, ways to recognize biases, and adaptive coping strategies (Moritz, Woodward, Stevens, Hauschildt, & Metacognition Study Group, 2010; the MCT manual is available on the Internet at: http://www.uke.de/mkt).

There is a rapidly growing body of research regarding the efficacy of MCT for schizophrenia. In their first study, Moritz & Woodward (2007b) randomly assigned 40 patients to an MCT group or a cognitive remediation control group (i.e., computer training program that increases attention, visual motor skills, memory, language, etc.) to assess participant satisfaction and subjective efficacy. They found that the MCT program was rated significantly better compared to the control program on a number of outcome measures (i.e., fun, boredom, recommendation to others, and usefulness to daily life). Similarly in another pilot study, 30 participants with schizophrenia were randomly assigned to MCT or a newspaper discussion group. Post-treatment, the MCT group showed a greater decline in positive symptoms ($d = 0.43$) as well as reduced jumping to conclusions ($d = 0.31$); the MCT program was also rated more favorably than the control program (Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010). In yet another study, Moritz and colleagues (Moritz, Kerstan, et al., 2011) randomly assigned 36 individuals with schizophrenia to either an MCT or a wait-list control group who received treatment-as-usual. Compared to the control group, on a blind post-treatment assessment, participants in the MCT group showed a greater reduction in distress caused by delusions, a greater reduction in jumping to conclusions, and more improvements in social quality of life.

In addition to these studies, Moritz and colleagues are also beginning to conduct research on the efficacy of MCT+, their individualized MCT program. In an initial study, they found that compared to patients in the control group (i.e., cognitive remediation), those who completed MCT+ showed greater declines in delusion severity, conviction in one's delusions, and jumping to conclusions. In keeping with their other findings, MCT+ also had excellent treatment adherence and subjective efficacy (Moritz, Veckenstedt, Randjbar, Vitzthum, & Woodward, 2011). Moreover, MCT efficacy research conducted by collaborators outside of the Metacognitive Study Group is also promising. For example, in England Ross and colleagues found that following only two MCT sessions, participants with schizophrenia exhibited more cautious decision-making (Ross, Freeman, Dunn, & Garety, 2011). In India, researchers assigned participants to MCT or treatment-as-usual and found that the MCT group showed a 28% decline in positive symptoms compared to a 12.9% decrease in the control group (Kumar et al., 2010). Lastly, in Switzerland, researchers found that after MCT, participants demonstrated a decline in severity of delusions, improved awareness of delusions, and improved mood (Favrod, Maire, Bardy, Pernier, & Bonsack, 2011).

There are several similar cognitive deficits exhibited by people with schizophrenia and ASD, such as challenges with Theory of Mind, executive functioning, and self-awareness. As such, the body of research on metacognitive training in schizophrenia acted as the impetus for the current set of studies described in this dissertation. Specifically, we wanted to build upon the goal set forth by Moritz, Woodward, and colleagues – that is, increasing awareness of how cognitive differences impact daily functioning – and apply them to an ASD sample.

Chapter Summary, Research Questions, & Hypotheses

A significant body of research has identified cognitive differences in high functioning individual with ASD, including detail-focused processing and deficits in executive functioning and self-awareness. These cognitive differences and lack of self-awareness impact the daily lives of people with ASD. While research in the field is growing, there is still a paucity of studies investigating metacognition (i.e., awareness of one's own cognitive differences) in ASD; this is problematic because self-awareness of one's symptoms (including cognitive differences) is important for self-advocacy, daily functioning, and treatment outcomes. The work by Wells in the area of anxiety and depression, and Moritz and Woodward in schizophrenia, have yielded promising findings regarding the efficacy of metacognitive training (i.e., teaching people about their cognitive processes and how they help or hinder daily functioning) in clinical populations.

Based upon the literature reviewed above, the primary objectives of this dissertation, and associated steps and hypotheses (when applicable), are as follows:

Objective 1: To develop a measure of cognitive traits common in people with ASD.

> To meet this objective, an exploratory factor analysis was used to examine a novel 46-item measure of cognitive traits common in ASD – i.e., Awareness of Cognitions Questionnaire (ACQ). The ACQ items were written by Laura Goodman and consisted of a series of descriptive statements. These statements described traits (i.e., stable patterns of behaviours, thoughts, emotions) that are associated with atypical cognitive processing observed in ASD. For example, "I have a hard time thinking of more than one way to solve a problem" describes a

behaviour often associated with executive functioning deficits in ASD. Four senior graduate students and three clinical psychology professors then reviewed the items. Further internal reliability of the total and factor scores was calculated.

Objective 2: *To validate the resulting questionnaire by investigating metacognition in high functioning youth with ASD.*

We hypothesized that when administered the ACQ, parents of youth with ASD would rate their children as having more autism-related cognitive traits and behaviors compared to the parent-ratings of the typically developing group. Additionally, we expected to find significant differences between self- and parent-ratings for the ASD group, but not for the comparison group. That is, parents of youth with ASD were expected to rate their children as having more cognitive differences than the youth would self-report, thus demonstrating poor metacognition in the youth.

Objective 3: *To develop a MCT protocol for adolescents with ASD.*

To meet this objective, we developed a manual for MCT, which provided facilitators with content and instructions for each of the seven weekly sessions. We then had the manual reviewed by psychologists with expertise in ASD and/or intervention research.

Objective 4: *To implement the MCT protocol.*

To meet this objective, we ran MCT groups with adolescents with high-functioning ASD, which Laura Goodman co-facilitated with a fellow graduate student.

Objective 5: *To evaluate MCT using both quantitative and qualitative methods.*

We hypothesized that MCT would be successfully adapted for youth with ASD as measured by participant and parent satisfaction, increased metacognition, and no adverse effects (i.e., no evidence of increased depressive symptoms or decreased self-esteem).

CHAPTER 2: THE AWARENESS OF COGNITIONS QUESTIONNAIRE

The following chapter is based on the manuscript entitled ‘Development and Application of the Awareness of Cognitions Questionnaire in Autism Spectrum Disorder’. Readers are advised that Laura Goodman, under the supervision of Dr. Shannon Johnson and committee members, Drs. Corkum and Eskes, developed the research questions and methodology for this research. She was responsible for developing the study protocol and proposal, applying for and obtaining funding to support this research, applying for and obtaining ethics approval, and overseeing all data collection. She conducted all of the background research and literature review for this manuscript and was responsible for all aspects of the writing process. Prior to submission, she received editorial feedback from the study’s co-authors, Drs. Johnson and Corkum. This manuscript is currently in preparation.

ABSTRACT

We developed the Awareness of Cognitions Questionnaire (ACQ) to investigate self-awareness of cognitive differences that are often associated with ASD. Study 1, an exploratory factor analysis of the ACQ, revealed the questionnaire to have four factors and satisfactory internal consistency. In Study 2, youth with ASD and matched comparison participants, and a parent for each, completed the ACQ. Parents of ASD youth reported more autism-related cognitive traits in their children than parents in the typically developing group. Youths with ASD reported fewer cognitive differences than their parents attributed to them, whereas comparison participants and their parents showed the opposite set of results. Results provide preliminary validation of the ACQ and highlight deficits in self-awareness of cognitive differences in ASD.

Introduction

Cognitive Differences in ASD

Autism spectrum disorder (ASD) is characterized by impairments in social interaction and communication, as well as repetitive and stereotyped patterns of behaviours and interests (American Psychiatric Association, 2013). Although perceptual and cognitive processing differences in high functioning individuals with ASD are consistently reported, these differences are not explicitly included in the current diagnostic criteria. The cognitive differences most often identified by previous research are executive functioning impairments (specifically, challenges with organization/planning and cognitive flexibility) and detail-focused processing. Moreover, there is a growing body of research suggesting that individuals with ASD have impairments in self-awareness. Differences in social cognition are also commonly reported in the literature. However, these deficits are already captured via readily available, reliable, and valid measures, such as the Empathizing Quotient (Baron-Cohen & Wheelwright, 2004), which assess the ability to perceive and respond to others' emotions and behaviours. Therefore, awareness, or lack thereof, of the cognitive differences associated with ASD, namely executive dysfunction and detail-focused processing, is the primary focus of the current studies.

Executive Functioning. It is well documented that a subset of high functioning individuals with ASD perform poorly on tasks of executive functioning, in the context of average or higher intellectual abilities (e.g., Hill, 2004; Pennington & Ozonoff, 1996; Russo et al., 2007). Executive functioning is a multifaceted construct, which includes, but is not limited to, planning and organization, initiation, problem solving, self-control, mental flexibility, and inhibitory control, and is critical for success in daily functioning (Jurado & Rosselli, 2007). Current research indicates specific and pronounced deficits in planning and organization as well as mental flexibility (Hill, 2004; O'Hearn, Asato, Ordaz, & Luna, 2008; Russo et al., 2007); overall, executive functioning appears to be "less sophisticated and flexible" (p. 1124) in individuals on the autism spectrum (O'Hearn et al., 2008). However, executive functioning is difficult to measure due to methodological concerns with many of the assessment tools, as well as the complexity of the construct itself; as such, more research is needed to better understand executive functioning deficits in ASD. Importantly, there is growing interest in understanding the potential relationships between executive functioning deficits and difficulty with daily living skills in ASD (e.g., Gilloty, Kenworthy, Sirian, Black, & Wagner, 2002; Jahromi, Bryce, & Swanson, 2013).

Detail-Focused Processing. In the late 1980s, Uta Frith suggested that individuals with ASD have difficulty integrating pieces of information into coherent wholes; instead, there is a tendency to focus on local information, at the expense of extracting the global meaning (Frith, 1989). In other words, processing in ASD is thought to be biased towards details or features of a stimulus (i.e., local information) rather than the whole or gestalt (i.e., global information) and in lay terms, this phenomenon is often described as 'not seeing the forest for the trees'. This is in contrast to typically developing individuals who demonstrate a global precedence; more specifically, they are faster and make fewer errors when processing global information vs. local information (see Kimchi, 1992 for a review).

Subsequent to Frith's original work, there has been a growing body of evidence pertaining to global and local processing and a number of different theories have emerged (e.g., Mottron & Burack, 2001; Plaisted, 2001; Baron-Cohen, 2006). Currently, the literature suggests that individuals with ASD outperform comparison participants when they complete tasks that require local processing; however, they can respond in a typical manner to global information when given specific instructions (e.g., Koldewyn, Jiang, Weigelt, & Kanwisher, 2013). Thus, the current picture is one of superior local (detail-focused) processing as a default preference for people with ASD (e.g., Happé & Frith, 2006; Mottron, Dawson, Soulières, Hubert, & Burack, 2006). While more research is still required, these challenges in executive functioning and local-global processing can (and do) negatively impact the daily functioning of people with ASD, in areas such as daily living skills, interpersonal relationships, and academic and professional success (e.g., Brown & Bebko, 2012; Endedijk, Denessen, & Hendriks, 2011; Gilloty et al., 2002; Hughes, 2011; Jahromi et al., 2013; Koldewyn et al., 2013).

Self-Awareness in ASD

Another significant cognitive difference in ASD is impairment in self- awareness. Building on Theory of Mind research, Frith and Happé (1999) suggested that if the mechanisms responsible for recognizing and describing mental states to others are the same as those required for reflecting on one's own mental states, then "self-knowledge is likely to be impaired just as is the knowledge of other minds" (p. 7). This potential lack of insight has far reaching implications, including the use of self-report questionnaires in clinical work and research and the efficacy of interventions that require self-reflection.

In the early to mid 2000s, researchers began to specifically assess self-awareness of symptomatology in youth with ASD. For example Green, Gilchrist, Burton, and Cox (2000), utilizing semi-structured interviews, found that almost a third of their youth participants with Asperger's syndrome had a "complete lack of insight" (p. 13) regarding interpersonal relationships and reported that only 15% had an accurate perception of their disability. In regard to social skills, Koning and Magill-Evans (2001) and Knott, Dunlop, and Mackay (2006) found that youth with ASD attributed better social skills to themselves as compared to parent and/or teacher ratings. Additionally, Williams and colleagues (e.g., Williams & Happè, 2010a; Williams & Happè, 2010b) have been using experimental methods to investigate self-awareness in ASD by examining participants' understanding of their own and others' emotions, mental states, and intentions. In a review article, Williams (2010) used this and other research to conclude that the "evidence lends substantial support to the idea that…individuals with autism have difficulty in reflecting on their own psychological selves" (p. 489).

Moreover, Johnson, Filliter, and Murphy (2009) examined self-awareness in youth with ASD using the Autism Spectrum Quotient (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) and the Empathizing Quotient (EQ; Baron-Cohen & Wheelwright, 2004). These questionnaires assess traits that are associated with the autism spectrum and the ability to perceive and respond to other's emotions and behaviours, respectively. Johnson et al. (2009) compared self- and parent-reports of high functioning youth with ASD and typically developing youth on the AQ and EQ. Consistent with previous studies (e.g., Baron-Cohen et al., 2001), they found higher AQ scores for the ASD group relative to the typical youth on both parent- and self-ratings. They concluded that this finding suggests that youth with ASD show some awareness of their ASD traits.

However, they also found that parent- and self-ratings differed significantly within the ASD group on the AQ and EQ, while there were no differences between parent- and self-ratings for the typically developing group. Specifically, youth with ASD rated themselves as having fewer autistic and more empathic features than did their parents, thus supporting previous research regarding limited self-awareness in ASD.

However, none of the aforementioned studies specifically investigated whether individuals with ASD are aware of their own cognitive differences (e.g., deficits in executive functioning and detail-focused processing). Being aware of, thinking about, and reflecting upon one's own cognitions is referred to as metacognition. As described above, cognitive processing differences are commonly present in people with ASD and have a significant impact on their daily lives. Poor awareness of one's cognitive differences and their related challenges would likely increase the difficulties associated with these differences, thus making metacognition a particularly important area to study.

Clinical Implications. Based on research examining people with schizophrenia, Alzheimer's disease, ADHD, and Obsessive Compulsive Disorder (OCD), it is evident that self-awareness has considerable implications for intervention efficacy and prognosis. For example, people with OCD who have adequate insight, experience more gains from exposure and response prevention therapy (Himle, Etten, Janeck, & Fischer, 2006) compared to those with poor insight. Similar results have been found in youth OCD populations (i.e., those with greater insight are more likely to respond to treatment and have better adaptive functioning; Garcia et al., 2010; Lewin et al., 2010; Storch et al., 2008). Poor awareness of one's own symptomatology, including cognitive differences, in schizophrenia is associated with poorer medication compliance, increased symptom severity, and poorer psychosocial functioning, treatment outcomes, and prognosis (Perivoliotis et al., 2010; Schwartz, 1998). Similarly, some research suggests that awareness of deficits may help youth with ADHD be motivated to participate in behavioural treatment (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007). As well, Mikami, Calhoun, and Abikoff (2010) found that youth with ADHD who self-reported competence despite clear impairments, had more conduct problems and poorer response to intervention.

Studies that have examined self-awareness in ASD and outcomes provide conflicting views at present. Verhoeven et al. (2012) recently reported that better self-awareness was associated with better social functioning and parent-reported daily functioning in youth with ASD. These authors highlight the importance of self-awareness by astutely suggesting that "[a]s long as individuals do not see personal behavior that could be improved, they are presumably less motivated to work on improvement of their daily real-world skills" (p. 890). Conversely, there is some research in ASD that indicates a relationship between awareness of symptoms and depression (e.g., Butzer & Konstantareas, 2003). It has been proposed that individuals on the autism spectrum with average to above average cognitive ability are better able to recognize their lack of social competency, social isolation/rejection, and attribute their social failures to personal deficits (e.g., Barnhill, 2001; Capps, Sigman, & Yirmiya, 1995; Sterling, Dawson, Estes, & Greenson, 2008). Given the important links between cognitive differences and outcomes in ASD and between self-awareness and outcomes in multiple patient populations, it seems important to understand how people with ASD perceive their cognitive abilities. In this study, we developed a questionnaire to assess awareness of cognitive differences in ASD and subsequently, examined whether there is limited metacognition in people with ASD similar to other reported deficits in self-awareness.

Goals & Hypotheses

We had two goals for this pair of studies. The first goal was to develop a questionnaire focused on cognitive traits common in people with ASD, the Awareness of Cognitions Questionnaire (ACQ), and evaluate the factor structure and internal reliability of this measure. Our second goal was to utilize the ACQ with a sample of youth with and without ASD and to assess metacognition in high functioning youth with ASD. For the purpose of the second study, we measured metacognition via the discrepancy between parent- and self- report. Other metacognitive measures ask individuals to directly reflect upon their own thinking processes (e.g. the Meta-Cognitive Questionnaire; Cartwright-Hatton & Wells, 1997). This methodology is problematic for an ASD population given the known deficits in self-awareness. As such, we utilized a discrepancy analysis to assess awareness of cognitive traits.

Our main hypothesis was that parents of youth with ASD would rate their children as having more autism-related cognitive traits and behaviors (i.e., higher scores) compared to the parent-ratings of the comparison group. Additionally, we hypothesized that we would observe significant differences between self- and parent-ratings on the ACQ for the ASD group, but not for the comparison group. Specifically, we expected that the parents of youth with ASD would rate their children as having more autistic-related cognitive traits than the youth would self-report, thus demonstrating poor metacognition in the participants with ASD.

Study 1

Participants

The data included in Study 1 was gathered from 233 female and 90 male university undergraduate students. The sample ranged in age from 17 to 30 years of age (*M* = 20.2, *SD* = 2.4). They were recruited via our research lab or undergraduate psychology classes. In addition to completion of the ACQ, we gathered current age (in years) and sex for all participants.

Material

The ACQ analyzed in this study was a 46-item self-report questionnaire developed to assess metacognition of cognitive traits associated with ASD. The ACQ consists of a series of descriptive statements designed to assess three areas of cognition that are often impaired in ASD: organization and planning (items: 1, 4, 6, 11, 15, 17, 20, 25, 29, 33, 35, 39, 42, 44, 45); cognitive flexibility and transitions (items: 2, 8, 9, 12, 13, 16, 19, 22, 24, 27, 31, 34, 36, 38, 41); and detail-focused processing (items: 3, 5, 7, 10, 14, 18, 21, 23, 26, 28, 30, 32, 37, 40, 43, 46). Participants were asked to rate to what extent they agree or disagree with each statement on a 4-point Likert-scale ranging from *'definitely disagree'* (1) to *'definitely agree'* (4). Higher scores indicate more autism-related cognitive traits (e.g., item 15: "It's hard for me to follow new instructions"). During the questionnaire development stage, the items were written by the primary author and then given to others to review. Specifically, the items were reviewed by four senior graduate students with significant training in ASD, a clinical psychologist/professor (i.e., the last author) who has expertise in the area of cognition and ASD, and two additional clinical psychology professors. Items were edited to ensure that they were easy to comprehend and applicable to ASD, and to limit redundancy/overlap. Reviewers were also encouraged to add items they felt would improve the questionnaire. We included all suggested items knowing that some would be discarded upon factor analysis. Finally, items were worded so that there were approximately equal numbers of agree/disagree responses and items were reverse scored as needed.

Procedure

Participants were asked to complete either a paper-and-pencil or computerized version of the ACQ. Approximately 60% of the questionnaires were completed in the paper-pencil format. The person administering the questionnaire (i.e., research assistant, graduate student, or class instructor) chose the format based on ease of administration and personal preference. Paper-pencil questionnaires were distributed to students at the beginning of an undergraduate psychology class and collected upon completion. Participants who completed the computerized version of the questionnaire were provided a web address and password and completed the questionnaire online at their leisure. Only fully completed questionnaires were included in the analyses.

Results

Responses from the undergraduate participants on the ACQ were subjected to a principal components analysis (PCA). Prior to performing the PCA, we inspected the correlation matrix; this revealed the presence of many coefficients at or above 0.3, which suggested moderate to very strong correlations between many items. However, nine items (3, 8, 10, 16, 27, 28, 31, 40, 41) were weakly correlated with all other items and, as such, were removed from further analyses (Prett, Lackey, & Sullivan, 2003). Four of those items (8, 10, 28, 31) also had measures of sampling adequacy (MSA; an indicator of how strongly an item correlates to other items) below .06 (Kaiser, 1974), further supporting their removal. Diagnostic checks suggested that data from the remaining 37 items were suitable for PCA. The Kaiser-Meyer-Olklin value was .82, and the Bartlett's test of sphericity was significant ($\chi^2 = 4249.76$, $df = 1035$, $p < .001$) (Kaiser, 1974; Bartlett, 1950, respectively). The results of these analyses indicated it was appropriate to proceed with the factor analysis.

We used several approaches to determine the number of factors in the ACQ, including assessing eigenvalues, inspecting the scree plot, and conducting a parallel and a Minimum Average Partial (MAP) test. The combination of these tests suggested the potential for a three, four, six, or nine factor solution; as such, we compared the results from each solution by inspecting the factor pattern and factor structures matrices. Ultimately, we chose the four-factor solution because, compared to the others, it had the most acceptable factor loadings (i.e., above 0.6; Tabachnick & Fidell, 1989) and fewest cross-loadings (which can indicate problems such as a poor item or insufficient power; Costello & Osborne, 2005). The four-factor solution was supported by the results from the parallel test (i.e., the number of eigenvalues in the data set found to be higher than the eigenvalues obtained from the random data represents the number of factors that should be retained; Fabrigar, Wegener, MacCallum, & Strahan, 1999) and the MAP test (i.e., the number of factors is determined by assessing variance in the correlation matrix after extracting an increasing number of components; O'Conner, 2000).

We then selected an oblique rotation because we suspected, and subsequently confirmed, correlated factors (Prett, et al., 2003). Specifically, we used a Promax rotation (Hendrickson & White, 1964) to simplify the factor pattern loadings of the measured variables. To determine which items loaded onto each factor, the factor structure matrix was examined. While the four-factor solution provided an interpretable solution, there were a number of items that either did not load well onto any of the factors or cross loaded onto more than one factor. Two items (17, 20) were removed because they did not load well (< 0.4) onto any factor when examining the structure matrix. Six items cross-loaded onto two factors (35, 4, 15, 22, 23, 26); rather than remove the items, we placed each item on the factor it most closely related to conceptually (Prett et al., 2003).

Lastly, after inspection of the structure matrix, an additional four questions (7, 14, 30, 37) were removed because they loaded negatively onto a factor and did not conceptually relate to the other items in the factor (Prett et al., 2003). After the above-mentioned items were removed, the PCA using a Promax rotation was completed once more to determine the final pattern of factor loadings. The final four factors accounted for 43.17% of the variance. Factor 1 included 10 items pertaining to needing reminders and/or forgetting things (4, 6, 12, 25, 44, 45) and organizing/planning time (11, 35, 39, 42). This factor, labeled “Organization and Prospective Memory”, explained 20% of variance in the model. Factor 2 included nine items pertaining to multitasking and attention shifting (13, 34, 36), following or generating tasks with multiple-step instructions (1, 15, 33), and problem solving and abstract thinking (21, 23, 24). This factor, named “Flexible Thinking and Problem Solving”, explained 11% of variance in the model. Factor 3 included 6 items; all items pertained to liking and/or needing agendas and schedules/routines (18, 19, 22, 29, 38, 43). This factor, named “Scheduling & Routines”, explained 7% of variance in the model. Factor 4 named “Narrow & Detail-Focused Thinking”, explained 6% of variance in the model and contained six items.

Three items (5, 32, 46) are about attention to detail, while three items pertain to a desire for sameness (2, 9, 26). For a summary of the items' factor loadings and correlation between factors see Tables 2.1 and 2.2, respectively.

Internal consistency of the revised ACQ (i.e., 31 items) and its four factors were assessed with Cronbach's alpha coefficient (Cronbach, 1951). Alphas on the total ACQ, and Factors 1, 2, and 3 were at satisfactory levels (.70 is generally accepted as satisfactory; Streiner & Norman, 2003) at .80 (total ACQ), .85 (Organization & Prospective Memory*)*, .73 (Flexible Thinking & Problem Solving*)*, and .75 (Scheduling & Routines), respectively.

The alpha for Factor 4 (Narrow & Detail-Focused Thinking) was below the satisfactory level, at .55. A low number of items tend to deflate Cronbach's alpha coefficient spuriously, and only six items were included in this factor. It is also possible that uncorrelated latent factors (e.g., two possibilities were 'desire for sameness' and 'attention to detail') exist within this fourth factor. Further, Factor 4 contained an item (i.e., item 26) that was cross-loaded with Factor 3 but was more closely related conceptually to Factor 4. Additional analyses revealed that the internal reliability of Factor 4 was weaker when item 26 was removed.

Study 2

Participants

The second study included 20 parents and their children with ASD and 20 parents and their typically developing (TD) youth. For participants in the ASD group, youth met the following eligibility criteria: 1) a diagnosis of Autism Spectrum Disorder, Autistic Disorder, Asperger's Disorder, or Pervasive Developmental Disorder-Not Otherwise

Specified by the Autism Team at the IWK Health Centre (Halifax, NS) or by a professional in the community (i.e., a psychologist or psychiatrist) who uses best practices in ASD diagnosis; 2) no current diagnosis of another major psychiatric disorder; 3) no history of other neurological disorder (e.g., head injury, epilepsy); and 4) a performance and verbal IQ greater than 80 as assessed by the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999). All information regarding psychiatric and neurological disorders was assessed via a parent-screening interview administered when a parent called to schedule their child for the study and a demographics questionnaire completed by a parent during the study. The ASD youth sample consisted of three females and 17 males, ages 9 to 18 years of age (*M* = 14.4, *SD* = 2.3). The group's full scale IQ ranged from 92 to 139 (*M* = 111.6, *SD* = 12.5).

Youths in the TD sample could not have been diagnosed with any major psychiatric or neurological disorders. The sample consisted of five females and 15 males, ages 9 to 18 years of age (*M* = 13.1, *SD* = 2.6). The group's full scale IQ ranged from 89 to 137 (*M* = 114.1, *SD* = 15.7). Independent samples t-tests indicated that the ASD and TD groups did not differ in age, $t(38) = 1.61$, $p = .12$ or full scale IQ, $t(38) = -0.56$, $p = .58$.

Materials and Procedure

For Study 2, we administered the original 46-item ACQ to parents and youth with and without ASD. However, for the analyses, the revised 31-item ACQ, and its factor scores derived from Study 1, was utilized. For these participants, the ACQ was administered as part of a larger study. It was at the discretion of the research assistant or graduate student running the study whether to administer the computerized or paper-and-pencil version of the ACQ. As part of the larger study, the WASI was completed.

Results

Five 2x2 repeated measures Analysis of Variance (ANOVA) were completed for the ACQ data (i.e., the total score and four factor scores), with group (ASD and comparison) and rater (parent and self) as independent variables. Multiple ANOVAs were conducted so that the subsequent results from the total ACQ score and four factor scores could be compared (e.g., to assess whether the main/interaction effects were consistent across all factors). A Bonferroni correction was employed due to multiple ANOVAs and statistical significance was set at a p value of .01. Post-hoc t-tests were also completed when appropriate. Independent samples t-tests were used to compare the two groups on self-ratings and parent-ratings. Self- and parent-ratings were compared within the ASD and comparison groups, using paired samples t-tests. See Table 2.3 for the internal reliability of the ACQ and Table 2.4 for the means, standard deviations, and ranges of self- and parent-ratings on the ACQ.

Total ACQ. For the total ACQ score, the repeated measures ANOVA revealed a significant interaction between the group and rater variables ($F(1, 35) = 47.42, p < .001$). There was a significant between-subjects main effect of group ($F(1, 35) = 45.35, p < .001$), with higher scores for the ASD group compared to the comparison group. The within-subjects main effect of rater was not significant ($F(1, 35) = .12, p = .73$).

Follow-up t-tests revealed that total scores were higher for the ASD group than the comparison group for parent-ratings ($t(36) = 8.73, p < .001$), but not for self-ratings ($t(37) = 2.23, p = .03$). Parent- and self-ratings differed for the ASD group ($t(18) = -5.52$,

$p < .001$), with parents reporting significantly more autism-related cognitive traits than the typically developing youth. Interestingly, parent- and self-ratings also differed for the comparison group ($t(17) = 4.30$, $p < .001$), with youth reporting significantly more autism-related cognitive traits than their parents. Additionally, over 84% of parents rated their child higher on the ACQ total score than the youth self-reported, while only 11% of parents in the comparison group rated their child higher on the ACQ than their child rated him/herself.

Factor 1: Organization & Prospective Memory. For Factor 1, the repeated measures ANOVA revealed a significant interaction between the group and rater variables ($F(1, 36) = 27.00$, $p < .001$). In addition, there was a significant between-subjects main effect of group ($F(1, 36) = 9.62$, $p < .001$), with higher scores in the ASD group compared to the comparison group. The within-subjects main effect of rater was not significant ($F(1, 36) = .34$, $p = .34$).

Follow-up *t*-tests revealed that Factor 1 scores were higher for the ASD group than the comparison group for parent-ratings ($t(37) = 5.18$, $p < .001$) but not self-ratings ($t(37) = .01$, $p = .99$; see Table 2.3). Parent- and self-ratings differed for the ASD group ($t(18) = -5.25$, $p < .001$), with parents reporting significantly more autism-related cognitive traits than the youth; for the comparison group, the difference approached significance ($t(18) = 2.61$, $p = .02$), with youth reporting more autism-related cognitive traits than their parents.

Factor 2: Flexible Thinking & Problem Solving. For Factor 2, the repeated measures ANOVA revealed a significant interaction between the group and rater variables ($F(1, 37) = 28.03$, $p < .001$). There was a significant between-subjects main effect of group (*F*(1, 37) = 60.39, *p* < .001), with higher scores in the ASD group compared to the comparison group. The within-subjects main effect of rater was not significant (*F*(1, 37) = 1.86, *p* = .18).

Follow-up *t*-tests revealed that Factor 2 scores were higher for the ASD group than the comparison group for parent-ratings (*t*(37) = 8.99, *p* < .001) and self-ratings (*t*(38) = -3.91, *p* < .001). Parent- and self-ratings differed for the ASD group (*t*(19) = -4.24, *p* < .001), with parents reporting significantly more autism-related cognitive traits than the youth. Parent- and self-ratings also differed for the comparison group (*t*(18) = 3.23, *p* < .01), with youth reporting significantly more autism-related cognitive traits than their parents.

Factor 3: Scheduling & Routines. For Factor 3, the repeated measures ANOVA revealed a significant between-subjects main effect of group (*F*(1, 38) = 8.52, *p* = .01), with higher scores for the ASD group compared to the comparison group. The interaction between the group and rater variables approached significance (*F*(1, 38) = 5.87, *p* = .02). The within-subjects main effect of rater was not significant (*F*(1, 38) = 1.46, *p* = .23).

Follow-up *t*-tests revealed that Factor 3 scores were higher for the ASD group than the comparison group for parent-ratings (*t*(38) = 4.22, *p* < .001), but not self-ratings (*t*(38) = 1.06, *p* = .30). The difference between parent- and self-ratings approached significance for the ASD group (*t*(19) = -2.21, *p* = .04), with parents reporting more autism-related cognitive traits than the youth. Conversely, parent- and self-ratings did not differ for the comparison group (*t*(19) = 1.07, *p* = .30).

Factor 4: Narrow & Detail-Focused Thinking. For Factor 4, the repeated measures ANOVA revealed a significant interaction between the group and rater variables ($F(1, 38) = 15.22, p < .001$). There was also a significant between-subjects main effect of group ($F(1, 38) = 27.36, p < .001$), with higher scores in the ASD group compared to the comparison group. The within-subjects main effect of rater was also significant ($F(1, 38) = 10.81, p < .001$), with children rating themselves as having more autism-related cognitive traits than their parents.

Follow-up *t*-tests revealed that Factor 4 scores were higher for the ASD group than the comparison group for parent-ratings ($t(38) = 5.67, p < .001$), but not for self-ratings ($t(38) = .97, p = .34$). Parent- and self-ratings differed for the comparison group ($t(19) = 6.03, p < .001$), with youth reporting significantly more autism-related cognitive traits than their parents. Parent- and self-ratings did not differ for the ASD group ($t(19) = -.38, p = .70$).

Discussion

The goals of the present studies were 1) to develop and evaluate a questionnaire designed to assess self-awareness of cognitive difference commonly present in people with ASD and 2) to employ this measure to investigate metacognitive abilities in ASD. In Study 1, statistical analyses revealed the ACQ to have four factors accounting for 43% of the variance, and satisfactory internal reliability for the total ACQ score. In Study 2, parents in the ASD group rated their children as having higher scores than those in the comparison group, indicating more autism-related cognitive traits. Furthermore, we found that youth with ASD rated themselves as having fewer autism-related cognitive traits than did their parents. These results provide preliminary evidence for external validity of the ACQ and evidence for poor self-awareness of autism-related cognitive traits in the youth participants with ASD.

Study 1 Summary

In Study 1, we collected self-report data from over 300 undergraduate students using the Awareness of Cognitions Questionnaire (ACQ). Exploratory factor analysis revealed a four-factor structure that accounted for 43% of the variance. We completed multiple analyses that led to decisions about whether each item should be retained or removed; our original 46-item measure was reduced to 31-items in the final version of the measure. Examination of the psychometric properties of this final version revealed satisfactory internal consistency on all but one of the factor scores.

In their review articles, both Hill (2004) and Russo et al. (2007) discussed difficulties with planning, organization, and mental flexibility in high functioning individuals with ASD. These executive functioning deficits are reflected in three of the four factors that emerged from the factor analysis of the ACQ: (1) Organization and Prospective Memory; (2) Flexible Thinking and Problem Solving; and (3) Scheduling & Routines. While these factors differed slightly from those originally proposed in the measure's development, the factors were clearly in keeping with known areas of cognitive differences in ASD. The fourth factor, Narrow & Detail-Focused Thinking, is consistent with superior local processing (Happé & Frith, 2006) reported in ASD. The items mapped closely onto the originally proposed factor of global processing and noticing patterns.

Study 2 Summary

In Study 2 we examined how parents of youth with and without ASD rated their children's cognitive abilities in order to evaluate the external validity of the ACQ. Specifically, we examined how youth with and without ASD perceive their cognitive traits relative to how their parents perceive them. We analyzed parent- and self-reports on the revised 31-item version of the ACQ for a group of youth with ASD, as well as typically developing comparisons. Consistent with the questionnaire's design, we found higher ACQ scores for the ASD group relative to comparisons. This was the case for parent ratings on the total ACQ score, as well as on all four factor scores.

Furthermore, as hypothesized, we found that parent- and self-ratings differed within the ASD group on Factors 1 and 2, and on the total score. Specifically, youth with ASD rated themselves as having fewer autism-related cognitive traits than did their parents. Conversely, youth in the comparison group either did not differ from their parents' report or reported more autism-related cognitive traits than did their parents. We interpret these findings as further support for the continued refinement and use of the ACQ. After using an undergraduate sample to assess the factor structure and internal reliability of the questionnaire, we found differences on this measure between ASD and typically developing youths. This difference between ASD and typically developing participants and their parents is consistent with the questionnaire's design and purpose and as such, provides initial evidence for the validity of the ACQ.

Moreover, this discrepancy between parent- and self-reports in the ASD group is consistent with previous research. For example, Green et al. (2000) reported that only 15% of participants with Asperger's Disorder had an accurate perception of their disability and both Koning and Magill-Evans (2001) and Knott et al. (2006) found that youth with ASD attributed better social skills and competency to themselves as compared to parent and/or teacher ratings. Furthermore, Johnson and colleagues (2009) found that youth with ASD rated themselves as having fewer autistic features and more empathy than their parents attributed to them. Johnson et al. suggested that this poor self-awareness seen in youth with ASD may be similar to the Positive Illusory Bias that has been reported in children with Attention-Deficit Hyperactivity Disorder (ADHD) wherein those with ADHD often rate their own competency as very high in areas in which they have considerable challenges (Owens et al., 2007). This type of bias is thought to be protective. Overall, previous research suggests that individuals on the autism spectrum have significant difficulty reflecting upon and perceiving their own symptomatology and areas of competency (e.g., empathy, social skills). The current findings extend this limited self-awareness to the area of cognitive differences.

As noted by Johnson et al. (2009) it is possible the parent- and self-report discrepancies in the ASD group may not be caused by poor self-awareness in the youth. Johnson et al. stated, "[y]ears of experience learning about and living with a child with an ASD is likely to lead parents to be more knowledgeable of, observant of, and sensitive to autism related traits" (p. 1712) and as such, could result in over-reporting. However, there is now a growing body of research demonstrating this discrepancy (e.g., Johnson et al., 2009; Green et al., 2000; Koning & Magill-Evans, 2001) across distinct measures (i.e., both questionnaire and interviews) and multiple domains (e.g., social skills, empathy, cognitive traits). As such, it is likely that youth with ASD do under-report their symptomatology and as such, further investigation into poor self-awareness in ASD is warranted.

In regard to the current study, the results from the comparison group are also interesting. On the total ACQ score, as well Factors 2 and 4, typically developing children reported more autism-related cognitive traits than their parents attributed to them. Discrepancies between parent- and self-report of childhood psychopathology are quite common, usually with parents reporting more severe psychopathology than children endorse (De Los Reyes & Kazdin, 2005). In a review of the literature, De Los Reyes and Kazdin concluded that there is greater parent/child agreement on observable (e.g., often externalizing) symptoms compared to unobservable symptoms. It is noteworthy, however, that this research was conducted with youth with mental health disorders and has yet to be extended to children with developmental disorders or typically developing youth. Therefore, some degree of disagreement regarding cognition for our typically developing youths is not surprising given that some aspects of cognition are unobservable. Moreover, there is evidence from social psychology research that suggests that healthy adults often rate themselves as above average and provide consistently positive self-evaluations (Owens et al., 2007). It is possible that the parents in our study extended these positive beliefs to ratings of their typically developing children. Overall, little research has examined informant ratings of cognition in either typical or atypical populations and, as such, additional research is needed to better understand these results.

Clinical implications

The current findings contribute to the growing body of evidence indicating limited insight in ASD in a variety of domains. This limited insight has far reaching implications. Firstly, it brings into question the use of self-report questionnaires in clinical work and research. While widely used and often quite valuable, the reliability of self-report data is sometimes questioned given the insight required by respondents and the possibility for biased reporting (deliberate or not; Baldwin, 2000). Given deficits in self-awareness, self-report questionnaires may be particularly problematic when used with an ASD population. With that said, self-report measures still have an important place in clinical practice and research; they allow us to see how individuals with ASD view themselves and can provide a glimpse into their inner beliefs, attitudes, and emotions. However, these reports will need to be considered alongside information provided by other informants such as parents, teachers, peers, and professionals. While these other informants are still susceptible to providing biased information, taken together, they may help form a more complete picture of the person with ASD.

Secondly, as described in the introduction, self-awareness plays a critical role in intervention outcomes and prognosis for many clinical populations. For example, youth with OCD who demonstrate poor insight, experience fewer gains from intervention (e.g., Garcia et al., 2010; Storch et al., 2008). Poor awareness of one’s own symptoms, including cognitive differences, in schizophrenia is related to more severe symptoms, and poorer psychosocial functioning, treatment outcomes, and prognosis (i.e., increased relapses and hospitalizations; Perivoliotis et al., 2010; Schwartz, 1998). More recently, this research has been extended to the field of ASD. Verhoeven et al. (2012) found that better self-awareness of problematic behaviours at the start of treatment was associated with increased social functioning during treatment and decreases in parent-reported problems in daily functioning.

Therefore, this growing body of research suggests that self-awareness, including metacognition, may be an important target of intervention for youth and adults with ASD. Verhoeven et al. (2012) captured one of the key issues regarding poor self-awareness and ASD treatment in the following statement, “As long as individuals do not see personal behavior that could be improved, they are presumably less motivated to work on improvement of their daily real-world skills" (p. 890). Talk-based therapies (which often require significant introspection) may be less effective for individuals with ASD if they have limited awareness of their own thought processes and/or a skewed view of their own daily functioning and interpersonal interactions. Moreover, many of these therapies also require the completion of behavior and thought tracking homework that could also be hindered by the executive dysfunction and metacognitive deficits in ASD.

Additionally, self-awareness is also critical for self-advocacy. In a review of the literature, Test, Fowler, Wood, Brewer, and Eddy (2005) explained that the ability of individuals with disabilities to advocate for themselves (rather than relying on family, teachers, and clinicians to communicate one's individual needs) is critical for successful periods of transition (e.g., transitioning from adolescence and school to adulthood and the workforce). Test et al. noted that "[a] first step toward self-advocacy is to gain knowledge of one's own interests, preferences, strengths, needs, learning style, and attributes of one's disability" (p. 50). Therefore, increasing self-awareness of ASD symptoms, including cognitive differences, in intervention may be a fruitful direction for improving other treatment outcomes and self-advocacy skills for those with ASD.

However, any research looking to increase self-awareness in youth with ASD will have to proceed cautiously. Some ASD research has found a relationship between awareness of symptoms and depression (e.g., Butzer & Konstantareas, 2003). Individuals with ASD and average to above average cognitive ability may be more aware of their social skills deficits and subsequent peer rejection (e.g., Sterling et al., 2008; Barnhill, 2001; Capps et al., 1995). Similarly, some research suggests that for youth with ADHD, having an inflated sense of competence (i.e., poor awareness of actual impairments) may be a short-term protective factor against depression (Owens et al., 2007; Mikami et al., 2010). It will be important to monitor depressive symptoms in future self-awareness remediation research.

Limitations and Future Directions

Despite promising findings, there are a number of limitations that should be noted. Firstly, in developing the ACQ, we only included questions pertaining to executive functioning and detail-focused processing. Cognitive differences in these two domains, as well as social cognition, are well documented in the literature. Although deficits in social cognition are common in ASD, this domain was beyond the scope of the current study, in part, because of the availability of preexisting questionnaires that assess social deficits in ASD. We recognize that there are differences in other cognitive domains, such as language and memory that could have been included to gain a more comprehensive picture of metacognition in ASD. There is, however, less consensus in the literature regarding the nature of these cognitive differences in ASD and thus, we opted to focus on the domains with the most evidence. Moreover, we recognize that while the questions were designed to measure executive functioning and detail-focused processing, we have yet to validated whether participants' ACQ results reflect their real world cognitive differences. Therefore, it is critical that future research assess the concurrent validity of the ACQ by comparing ACQ scores to other reliable measures of cognition. Despite these limitations, our results suggest that discrepancy analysis may be a fruitful means by which to assess metacognition for other ASD symptoms. Therefore, future research may benefit from using the ACQ alongside other parent- and self-report measures (e.g., AQ, EQ) to further elucidate awareness of cognitive traits in ASD.

Secondly, the Factor 4 results (i.e., typical youth reported significantly more autism-related cognitive traits than their parents and parent- and self-ratings did not differ for the ASD group) need to be interpreted with caution. This is because the internal reliability of Factor 4 was below satisfactory levels. Despite its poor internal reliability, Factor 4 (Narrow & Detail-Focused Thinking) was included in the ACQ because it contained important items that are related to known cognitive differences in ASD. As well, Factor 4 contained an item (i.e., item 26) that was cross-loaded with Factor 3; moreover, this item loaded more strongly onto Factor 3 by .01. For all cross-loaded items, we took a consistent approach of placing the item onto the factor it most closely related to conceptually. As well, additional analyses revealed that the internal reliability of Factor 4 was weaker when item 26 was removed.

Another important limitation of the current study is the discrepant populations used for the exploratory factor analysis (i.e., Study 1) and the group comparisons (i.e., Study 2). The sample used for the factor analysis was a non-clinical undergraduate population that predominantly consisted of females in their 20s. This sample was chosen mainly due to convenience, given that factor analysis requires a very large sample size. Conversely, we designed the ACQ to be used mainly for high functioning individuals with ASD. Given this discrepancy, it is possible that a different factor structure would have emerged if we used an ASD sample for Study 1. More information regarding the reliability and validity of the ACQ could be obtained by a confirmatory factor analysis using a sample of typically developing youth, a sample of youth with a range of neurodevelopmental disorders, or ideally, using a sample of youth and/or adults on the autism spectrum.

The findings of Study 2 (i.e., group differences between youth with ASD and comparison participants) provide preliminary support for use of the ACQ for youth with ASD. However our ASD sample was fairly homogeneous (i.e., male; average to above average intelligence; narrow age range). As such, it would be beneficial to bolster the results of Study 2 through a series of follow-up studies. Specifically, this study should be duplicated using both younger children and adult ASD samples to further explore self-awareness deficits across development. As well, a shortcoming of the current study was that we only used two informants, self and one parent. Using multiple informants may help researchers obtain a more complete, and perhaps a more accurate, picture of the participants being studied. This would allow for a more detailed exploration of self-awareness. Teacher and/or clinician reports may be useful as these professionals often have a strong grasp of child development and variability in child behaviour (normative and atypical), and may be more attentive to cognitive abilities and challenges.

Future research would also benefit from investigating how individual characteristics are related to self-awareness. There has been a significant body of research looking at the phenomena of informant discrepancies in assessing childhood psychopathology, including if and how informant characteristics influence reporting (see De Los Reyes & Kazdin, 2005 for a review). It will be important to better understand how self-awareness in ASD changes across development and/or varies depending on the severity of symptoms, intellectual ability, and level of adaptive functioning of an individual. Furthermore, parent characteristics, such as psychopathology and stress, need to be considered when examining self-awareness as measured by informant discrepancies (De Los Reyes & Kazdin, 2005). In a recent study, Lerner, Calhoun, Mikami, and De Los

Reyes (2012) examined self- and parent-reported social functioning in youth with ASD. In keeping with previous research, parents reported significantly poorer social skills compared to the youth self-reports. Interestingly, they also found that greater informant discrepancies predicted lower parental self-efficacy and suggested that increased stress in parents may cause them to rate their children as functioning more poorly. Therefore, future studies should consider potentially relevant parent and child factors.

Summary and Conclusion

In Study 1 we created a novel measure to investigate self-awareness of cognitive differences commonly present in people with ASD. An exploratory factor analysis revealed the questionnaire to have four factors, which accounted for 43% of the variance, and satisfactory internal consistency. In Study 2, we explored metacognition in youth with ASD. Comparisons of self- and parent-reports indicated that youths with ASD reported significantly fewer autism-related cognitive traits than their parents attributed to them. The current results provide preliminary validation for the ACQ, as well as evidence for poor metacognition in youth with ASD. In addition to further evaluating the ACQ, future research should investigate relationships between metacognition and informant characteristics, as well as other variables that may help us better understand the exact nature and extent of poor self-awareness in ASD. Overall, the ACQ appears to be a promising new measure that may help inform both researchers and clinicians about metacognition in individuals on the autism spectrum.

Table 2.1 Factor Loadings from ACQ

Item Number	Item Description	Factor 1	Factor 2	Factor 3	Factor 4
25	reminded to do things	.76	--	--	--
45	reminders to complete things	.70	--	--	--
44	forget to bring things home	.69	--	--	--
42	getting through routine	.67	--	--	--
35	organizing time	.65*	.42	--	--
4	keeping track of assignments	.64*	.47	--	--
39	trouble starting on homework	.58	--	--	--
6	losing things	.56	--	--	--
11	sticking to plans	.58	--	--	--
12	overly focused on one thing	.55	--	--	--
23	missing main point	.42	.69*	--	--
33	doing multi-step tasks	--	.60	--	--
34	following conversation	--	.53	--	--
13	multi-tasking	--	.59	--	--
15	following new instructions	.42	.61*	--	--
1	organizing events	--	.51	--	--
36	'stuck' on topics or ideas	--	.45	--	--
21	understanding stories' meaning	--	.46	--	--
24	problem solving	--	.50	--	--
38	visual schedule	--	--	.74	--
18	dates and calendars	--	--	.72	--
19	knowing the daily plan	--	--	.67	--
29	agenda use	--	--	.63	--
22	daily routine	--	--	.60*	.45
43	order of activities	--	--	.55	--
26	organizing possessions	--	--	.46	.45*
32	looking at details	--	--	--	.61
5	noticing details	--	--	--	.57
46	noticing sounds	--	--	--	.50
2	think/talk about the same thing	--	--	--	.47
9	doing things the same way	--	--	--	.45
Eigenvalue		6.19	3.35	2.08	1.77
% Var Explained		19.96	10.79	6.72	5.71

Note. Factor 1: Organization and Prospective Memory; Factor 2: Flexible Thinking and Problem Solving; Factor 3: Scheduling and Routines; and Factor 4: Narrow and Detail-Focused Thinking. Items with factor loadings less than the absolute value of .40 are denoted with "--." For cross-loaded items, the * indicates where the item was placed in the final factor solution.

Table 2.2 Factor Correlations

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	-			
Factor 2	.43	-		
Factor 3	-.18	.00	-	
Factor 4	0.04	.21	.16	-
Items *(N)*	10	9	6	6

Note. Correlations are *r* scores. Factor 1: Organization and Prospective Memory; Factor 2: Flexible Thinking and Problem Solving; Factor 3: Scheduling and Routines; and Factor 4: Narrow and Detail-Focused Thinking.

Table 2.3 Internal Reliability

	Self		Parent	
	ASD	Comparison	ASD	Comparison
Factor 1	.77	.84	.90	.89
Factor 2	.73	.70	.78	.84
Factor 3	.80	.72	.39	.75
Factor 4	.15	.00	.64	.30
Total	.83	.49	.85	.91

Note. Internal reliability of the ACQ is measured by Chronbach's alpha ($\alpha \geq 0.9$ = Excellent; $0.7 \leq \alpha < 0.9$ = Good; $0.6 \leq \alpha < 0.7$ = Acceptable; $0.5 \leq \alpha < 0.6$ = Poor; $\alpha < 0.5$ = Unacceptable). Factor 1: Organization and Prospective Memory; Factor 2: Flexible Thinking and Problem Solving); Factor 3: Scheduling & Routines; Factor 4: Narrow & Detail-Focused Thinking)

Table 2.4 Means, standard deviations, and ranges of self- and parent-ratings for factors on the ACQ

	Self		Parent	
	ASD	Comparison	ASD	Comparison
Factor 1				
M	24.70	24.68	31.16*$^{+}$	20.00
SD	5.61	5.98	7.42	6.00
Range	11 – 33	12 – 34	11 – 40	12 – 34
Factor 2				
M	22.20*	16.90	27.55*$^{+}$	13.89^{+}
SD	4.58	3.96	5.11	4.32
Range	12 – 30	9 – 23	12 – 35	9 – 26
Factor 3				
M	15.75	14.50	17.85*	13.80
SD	3.95	3.52	2.82	3.24
Range	9 – 24	8 – 22	14 – 22	8 – 21
Factor 4				
M	17.85	17.20	18.20*	13.10^{+}
SD	2.23	1.99	3.27	2.31
Range	15 – 24	14 – 22	11 – 23	8 – 16
Total				
M	80.50	73.63	95.11*$^{+}$	60.00^{+}
SD	11.66	6.78	12.63	12.14
Range	50 – 96	60 – 83	55 – 113	40 – 90

Note. Higher ACQ scores reflect more autistic cognitive traits. The range of possible scores are: 10-40 (Factor 1: Organization and Prospective Memory); 9-36 (Factor 2: Flexible Thinking and Problem Solving); 6-24 (Factor 3: Scheduling & Routines); 6-24 (Factor 4: Narrow & Detail-Focused Thinking); and 31-124 (Total)

* ASD versus comparison differ at $p < .001$

$^{+}$ Parents versus child differ at $p < .01$

CHAPTER 3: METACOGNITIVE TRAINING

The following chapter is based on the manuscript entitled 'Metacognitive Training for High Functioning Adolescents with Autism Spectrum Disorder: A Pilot Study'. Readers are advised that Laura Goodman, under the supervision of Dr. Shannon Johnson and committee members, Drs. Corkum and Eskes, developed the research questions and methodology for this research. She was responsible for developing the study protocol and proposal, applying for and obtaining funding to support this research, applying for and obtaining ethics approval, and overseeing all data collection. She conducted all of the background research and literature review for this manuscript and was responsible for all aspects of the writing process. Prior to submission, she received editorial feedback from the study's co-authors, Drs. Johnson and Corkum. This manuscript is under revision based on peer review from the Journal of Intellectual & Developmental Disability.

Abstract

Cognitive differences, both strengths and challenges, are common in high functioning individuals with Autism Spectrum Disorder (ASD). There is growing evidence that self-awareness is an area of difficulty in ASD. However, cognitive differences and self-awareness are rarely targeted for intervention despite evidence that awareness of strengths and challenges is important for self-advocacy, daily functioning, and treatment outcomes. In order to increase knowledge about personal strengths and challenges and develop self-advocacy skills, we developed and evaluated a metacognitive training (MCT) program for teens with ASD. Two groups of four male adolescents with ASD completed the seven-week MCT program, as well as completed program evaluation measures administered in a basic time series design. Both visual inspection of single-subject data and thematic analysis were used to interpret the data. Overall, both participants and their parents rated MCT favourably; the youth most enjoyed the interactive group activities, whereas parents appreciated the social aspects of the group (both for themselves and for their children) as well as the information provided to them in a psycho-education session. There were no systematic changes on quantitative measures of self-esteem, depression, or metacognition. The positive appraisal and lack of adverse effects suggest further investigation of MCT is warranted.

Introduction

Cognitive Differences in ASD

There is a long-standing and growing body of research elucidating the cognitive differences in high functioning individuals with Autism Spectrum Disorder (ASD). Despite this research, cognitive differences are not part of the current diagnostic criteria based on the Diagnostic and Statistical Manual-5th Edition (APA, 2013) and are not a specific target of current interventions. Many of these cognitive differences fall under the umbrella term of 'executive functioning', which refers to higher-order processes that allow humans to cope and succeed in our "constantly changing environment" (Jurado & Rosselli, 2007, p. 214). These processes include functions such as planning and organization, initiation, problem solving, self-control, mental flexibility, and inhibitory control. It is well documented that there are a subset of individuals on the autism spectrum who have average to above average intellectual abilities yet still perform poorly on some tasks of executive functioning, particularly those that assess planning, mental flexibility, and self-monitoring (see Hill, 2004 and Russo et al., 2007 for reviews). Overall, executive functioning in ASD appears to be "less sophisticated" (O'Hearn, Asato, Ordaz, & Luna, 2008; p. 1124) and is related to poor daily functioning for these youth, such as difficulty with academic and social engagement and success (e.g., Endedijk, Denessen, & Hendriks, 2011; Gilloty, Kenworthy, Sirian, Black, & Wagner, 2002; Jahromi, Bryce, & Swanson, 2013).

Another cognitive difference in ASD is a detail-focused processing bias; that is, individuals on the autism spectrum tend towards processing features of stimuli (i.e., local information) rather than the whole (i.e., global information; Happé & Frith, 2006).

Typically developing individuals' default is to attend to global information, as indicated by faster identification of global information relative to local information, as well as a slowing of local processing when competing global information is present (see Kimchi, 1992 for a review). People with ASD often outperform control participants on tasks that require local processing, however, when instructed to do so, ASD participants can respond in a typical manner to global information (e.g., Koldewyn, Jiang, Weigelt, & Kanwisher, 2013). Therefore, superior local processing is likely a default preference for people with ASD (Happé & Frith, 2006; Mottron, Dawson, Soulières, Hubert, & Burack, 2006) and importantly, has been linked to difficulties with learning as well as understanding language and social interactions (Brown & Bebko, 2011; Koldewyn et al., 2013).

Self-Awareness in ASD

Self-awareness appears to be another important area of cognitive difference in ASD. In an attempt to understand the poor insight often observed in individuals with ASD, Frith and Happé (1999) posited a potential relationship between Theory of Mind and self-awareness. They theorized that there might be a common mechanism responsible for identifying other's mental states and for reflecting upon one's own mental state. To explore this hypothesis, some researchers have examined the differences between how parents report their children's ASD symptoms compared to how the children describe themselves. For example, several researchers have found that youth with ASD attribute better social skills to themselves as compared to parent and/or teacher ratings and have significant difficulty accurately reflecting upon their own role in interpersonal problems (e.g., Green, Gilchrist, Burton, & Cox, 2000; Koning & Magill-Evans, 2001; Knott, Dunlop, & Mackay, 2006; Lerner, Calhoun, Mikami, & De Los Reyes, 2012). Moreover, Green et al. (2000) found that almost a third of their participants had a "complete lack of insight" (p. 13) regarding their disability.

Another recent study (Johnson, Filliter, & Murphy, 2009) used the Autism Spectrum Quotient and Empathizing Quotient, to assess informant discrepancies on traits that are associated with ASD and the ability to perceive and respond to others' emotions and behaviours (Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001 and Baron-Cohen & Wheelwright, 2004, respectively). They found that youth with ASD rated themselves as having fewer autistic and more empathic features than did their parents. Goodman, Corkum, and Johnson (2014) used this same methodology to assess whether individuals with ASD were able to accurately perceive their own cognitive differences (i.e., metacognition). They found that youth with ASD rated themselves as having fewer autism-related cognitive traits than did their parents. Taken together, this research suggests that children and adolescents with ASD have limitations in their metacognition and limited insight into their own autism symptomatology and social skills.

This lack of awareness of one's own symptoms has significant clinical implications. Treatment research from schizophrenia, Alzheimer's disease, attention-deficit/hyperactivity disorder (ADHD) and obsessive compulsive disorder (OCD) populations has shown that more self-awareness of symptoms is related to better functioning (i.e., decreased levels of depression and/or agitation, fewer cognitive deficits, better psychosocial functioning, medication compliance, etc.) and positive treatment outcomes (Harwood, Sultzer, & Wheatley, 2000; Himle, Etten, Janeck, & Fischer, 2006; Perivoliotis et al., 2010; Schwartz, 1998). Specifically in youth populations, children and adolescents with OCD who demonstrate greater insight are more likely to respond positively to treatment and have better adaptive functioning than those with poor insight (Garcia et al., 2010; Lewin et al., 2010; Storch et al., 2008). Similarly, youth with ADHD who have greater awareness of their deficits may be more motivated to participate in intervention (Owens, Goldfine, Evangelista, Hoza, & Kaiser, 2007) and conversely, those with poorer insight may have more conduct problems and poorer response to intervention (Mikami, Calhoun, & Abikoff, 2010). Moreover, research suggests that children and teens with ADHD benefit from ‘demystification workshops’ in which they learn accurate information about their disorders (e.g., increase in participant’s knowledge of ADHD, its impact on their lives, coping strategies, and options of evidence-based interventions; Blotnicky-Gallant, Costain, & Corkum, 2013; McKay & Corkum, 2006).

In regard to youth with ASD, Verhoever et al. (2012) found that more self-awareness of problematic behaviours was associated with better social functioning and parent-reported daily functioning during treatment. They astutely noted that self-awareness is critical because, “[a]s long as individuals do not see personal behavior that could be improved, they are presumably less motivated to work on improvement of their daily real-world skills” (p. 890). The work by Verhoever et al., as well as the findings from intervention research across the wide range of disorders, highlights an important link between self-awareness and outcomes and suggests that self-awareness could be a valuable target for intervention.

This is an important consideration for individuals with ASD, as behavioural difficulties are common and approximately half have at least one comorbid psychiatric disorder, such as anxiety and/or depression (Farley et al., 2009). Importantly, many mental health treatment modalities require significant introspection including self-report of thoughts and feelings. These interventions may be less effective for individuals with ASD if they have limited and/or an inaccurate view of their own adaptive and psychosocial functioning as well as less motivation for treatment compliance. Moreover, it is likely that limited metacognition and a lack of knowledge of how to manage one's cognitive differences may impede academic, career, and social success. Therefore, it is evident that self-awareness is a valuable intervention target for those with ASD. However, we must proceed cautiously with this line of intervention as some research suggests a potential relationship between self-awareness, particularly of one's own poor social skills and social rejection/isolation, and depression for high-functioning individuals on the autism spectrum (e.g., Barnhill, 2001; Sterling, Dawson, Estes, & Greenson, 2008).

Metacognitive Therapy

In the mid-1990s, Adrian Wells (1995) proposed a metacognitive model of anxiety and an associated therapy. Metacognitive therapy focuses on modifying patients' 'thoughts about thoughts', 'worries about worry', and people's beliefs about the power and consequences of symptoms such as rumination (Wells, 2009). Metacognitive therapy has been adapted for various disorders, including general anxiety disorder, OCD, post traumatic stress disorder (PTSD), and depression (e.g., Rees & Van Koesveld, 2008; Van der Heiden, Muris, & Van der Molen, 2012; Wells & Colbear, 2012; Wells et al., 2012). While the majority of research on MCT has used uncontrolled trials, these preliminary data suggest that metacognitive therapy is likely effective even when delivered in a brief format (e.g., Wells & Colbear) and via a self-help manual (Moritz, Jelinek, Hauschildt, &

Naber, 2010).

Of particular relevance to the current study, a related intervention, entitled metacognitive training (MCT), was developed for patients with schizophrenia (Moritz & Woodward, 2007b). There is preliminary support for its feasibility, safety, subjective efficacy, and beneficial effects (e.g., Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely, 2010; Moritz, Kerstan et al., 2011). The authors of this intervention state that the goal of MCT is to "transfer knowledge of cognitive biases obtained from basic research to people diagnosed with schizophrenia", to "sharpen patients awareness of those cognitive biases, and to transfer this knowledge for application to daily life" (Moritz & Woodward, 2007a, p. 619, 623, respectively). The metacognitive training program developed for schizophrenia is adaptable to individuals with ASD because both patient populations have significant cognitive differences that impact daily living (for review of cognitive differences in schizophrenia see Bell, Halligan, & Ellis, 2006). In their training program, the MCT authors target cognitive biases such as jumping to conclusions, attribution style, false memory, decision-making, theory of mind, and self-esteem, using didactic lectures, real-world examples, activities, and homework (Moritz, Woodward, Stevens, Hauschildt, & Metacognition Study Group, 2010).

Metacognitive Training for ASD

The goal of the current study was to develop, pilot, and evaluate metacognitive training (MCT) for high functioning adolescents with ASD. Targeting self-awareness in older youth and teens is particularly important because "everyday metacognitive demands for organization, planning, and working memory increase dramatically as children become adolescents and enter secondary school settings with multiple teachers, longer term assignments, and more cumulative testing” (Rosenthal et al., 2013; p. 14). Moreover, Test et al., (2005) explained that the ability of individuals with disabilities to advocate for themselves (rather than relying on family, teachers, clinicians, etc. to communicate one’s individual needs) is critical for successful periods of transition (e.g., transitioning from adolescence and school to adulthood and the workforce). They noted that “[a] first step toward self-advocacy is to gain knowledge of one’s own interests, preferences, strengths, needs, learning style, and attributes of one’s disability” (p. 50). The protocol for MCT was explicitly designed to meet this ‘first step’.

The current MCT protocol for ASD consists of seven group sessions, each 90 minutes in length; see Table 3.1. We chose a group approach because Rees and van Koesveld (2008) noted that metacognition therapy in schizophrenia is well-suited for a group format because it bypasses the need to target each participant’s specific symptoms while potentially providing additional benefits such as peer modeling and support and normalizing the participants’ experiences. In the current protocol, the first session included an introduction to the therapists, psychoeducation regarding metacognition, and goal setting. Rather than setting individual goals, the participants worked towards a common goal – the development of a presentation on cognitive differences in ASD and personal strengths and challenges to share with the parents of the group members. Sessions two through four consisted of a short didactic PowerPoint presentation to introduce the topic of the day (i.e., executive functioning, mental flexibility, big picture thinking), followed by a hands-on activity, and subsequent discussion. The final sessions involved review of the material, preparation for the presentation, and the presentation for invited guests. The goal of the presentation was to help the participants consolidate the information they learned over the course of MCT and to take a first step in self-advocacy.

The current research study consisted of two phases: development and implementation. The goal of the first phase was to develop a MCT manual for adolescents with ASD and have it evaluated by experts in the field. The goals of the second phase were: 1) to evaluate participants' satisfaction with MCT; 2) to assess potential adverse effects of MCT (i.e., increased depression and/or decreased self-esteem); and 3) to assess whether metacognition changed over the course of the training program. We hypothesized that MCT would not only be well received but that it would also lead to increased metacognition without any adverse effects.

Development Phase

Participants. Four Canadian psychologists with expertise in ASD and/or intervention research were invited to review and provide feedback on the MCT manual. Reviewers, who were not included as manuscript authors, were given a $100.00 honorarium for their contribution.

Material. The MCT manual was designed to help inform group facilitators. The manual included: session topics and goals; rationale for and processes of carrying out the activities; discussion questions; and supplemental handouts for the participants and PowerPoint slides. We designed MCT to be predominantly activities-based to help participants recognize their own personal strengths and challenges in a fun, interactive format.

Procedure. After writing the MCT manual, an initial draft was reviewed by four psychologists. They were asked to provide feedback for the following areas: (1) the clarity and achievability of the MCT goals; (2) session activities and guided discussions (e.g., appropriateness given participants' age and diagnosis; comprehensiveness of rationale and instructions; etc.); (3) formatting and readability of the manual; and (4) other suggestions or areas of concern.

Results. The key suggestions of the reviewers were: simplify the language used in the manual; provide more concrete examples of cognitive differences in ASD; and remember to focus on participants' strengths. They also noted the importance of considering participants' developmental abilities, maturity, and attention, which could impact their motivation to engage in MCT, learn the concepts, and benefit from the material. The self-advocacy presentation for parents at the end of MCT was also suggested by a reviewer. All feedback was taken into consideration and the manual was subsequently revised. See Table 3.2 for a summary of the feedback provided by each reviewer.

Implementation Phase

Participants

For the MCT program evaluation, there were eight participants ages 14 to 17 (grades 8 to 11). See Table 3.3 for demographic and characterization information. All individuals had been previously diagnosed with Autistic Disorder, Asperger's disorder, or Pervasive Developmental Disorder – not otherwise specified as defined by DSM-IV-TR (American Psychiatric Association, 2000) criteria using a best clinical estimate approach to diagnosis by a private psychologist or team of clinicians with expertise in ASD diagnosis. Diagnoses were confirmed using the Autism Diagnostic Observation Schedule (Lord, Rutter, & Le Couteur, 1994), the Autism Quotient (Baron-Cohen et al., 2001 & 2006) and the Social Responsiveness Scale (Constantino & Gruber, 2005). Additionally, based on parent report, three participants were also diagnosed with ADHD (two of whom were being treated with medication) and two participants had a diagnosed learning disorder.

Participants were excluded if: (1) English was not their first language; (2) their performance and verbal IQ was less than 80, as assessed by the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999); (3) they had a history of traumatic brain injury or significant neurological disorder; (4) they had a current diagnosed mental health disorder (e.g., major depression) as assessed via parent report and confirmed using the Behavioral Assessment System for Children – Second Edition (Reynolds & Kamphaus, 2004) and the Kiddie-Schedule for Affective Disorders and Schizophrenia Present and Lifetime (Kaufman et al., 1997); (5) they were currently undergoing or intended to take part in other psychological treatments during their participation in MCT; or (6) a parent was unable to participate. Exclusion criteria pertaining to mental health and intervention were used to reduce the potential for adverse effects (e.g., increased depressive symptoms; interference with mental health intervention; etc.). We conducted two MCT groups, each with four participants. The first group ran from October to November 2011 and the second group occurred during April to June of 2012. Participants were placed in a group based on when they volunteered to participate.

Materials

To evaluate the MCT program, we measured four main areas: (1) participant and parent satisfaction; (2) self-esteem; (3) depression; and (4) metacognition. We developed an exit interview to administer post-MCT that assessed participant and parent satisfaction. The semi-structured interview asked both parents and participants to describe what they learned from MCT, their likes and dislikes about the group, and if/how they expect to use the information learned. As well, participants were also asked to rate how much they liked or disliked certain aspects of the group (i.e., activities, discussion, parent presentation) on a 5-point Likert scale (i.e., 1 to 5). All interviews were videotaped with consent and subsequently transcribed. The interviews were conducted by the first author, who also acted as the primary MCT group facilitator.

Secondly, we assessed potential adverse effects of MCT, specifically self-esteem and depression. To assess self-esteem, we administered the Piers-Harris Children's Self-Concept Scale, Second Edition (PHCSCS-2; Piers & Herzberg, 2002). The PHCSCS-2 is a 60-item questionnaire that assesses youth self-concept using a simple yes-or-no response format. For the purpose of this study, we used the total score; a T-score above 40 represents the average to above average range. The total score has acceptable internal (α = .81). To assess depression, we administered the Children's Depression Inventory – Second Edition (CDI2; Kovacs, 2011). The CDI2 is a self-report questionnaire that measures the cognitive, affective, and behavioural signs of depression in children and adolescents. Participants choose one of three sentences that best describes them over the past two weeks. For the purpose of this study, we used the total CDI2 score; a T-score below 60 represents the average range. The total CDI2 score has excellent internal (α = .91) and test-retest (r = .98) reliability.

To assess metacognition, we used the Awareness of Cognitions (ACQ; Goodman et al., 2014). The ACQ is a 31-item self- and parent- report questionnaire developed to evaluate metacognition in individuals with ASD. Four specific areas of metacognition are assessed: (1) Organization & Prospective Memory; (2) Flexible Thinking & Problem

Solving; (3) Scheduling & Routines; and (4) Narrow & Detail-Focused Thinking. Participants were asked to rate the extent to which they agree or disagree with each statement on a 5-point Likert-scale ranging from '*definitely disagree*' to '*definitely agree*'. Questions include: "I need reminders to complete things on time", "I have very strong interests, but only for a few topics", and "People tell me I sometimes get 'stuck' on topics or ideas". Parents answer the questions as they relate to their child's behaviour. The range of total raw scores is 31 – 155 and higher scores indicate more autism-related cognitive traits. Item scores are then added to derive a total score, which was used for the current study. Goodman et al. found that the ACQ total score had satisfactory internal reliability (Cronbach's alpha = .80).

Procedure

We recruited participants via our laboratory research participant databases and local psychologists. After potential participants were screened and consented to participate, they each completed a battery of characterization measures (approximately five hours of testing), which included assessment of intelligence, language, ASD symptomatology/severity, mental health, and cognitive abilities (e.g. executive functioning); see Tables 3.3 and 3.4. The first author or another senior clinical psychology PhD student in our laboratory conducted all assessments. If the participant had recently (i.e., within one year) received a psychoeducational or cognitive assessment, we obtained consent to request the IQ scores from the psychologist and utilized these data instead of re-administering the same or similar measure.

The MCT program consisted of seven treatment sessions. All sessions took place in a small classroom on a Saturday morning or afternoon. To evaluate MCT, we administered a set of online questionnaires (i.e., the self-report ACQ, CDI2, and PHCSCS-2); the parent-report ACQ was also administered online pre-MCT. These questionnaires (both parent and youth) were administered three times before the first session in order to assess baseline stability. We then re-administered them to the youth participants, three times during the course of MCT and three times post-intervention, with each administration spaced two weeks apart. This methodology is a common within-series intervention design in which each child acts as his or her own control (Barlow, Nock, & Herson, 2009). The outcome data collected is compared across the two main conditions (pre-intervention and intervention; information is also gleaned from the post-intervention data) and is often referred to as a basic time-series design (Kratochwill & Levin, 2010). Within two weeks of the completion of MCT, participants and their parents completed the semi-structured exit interview to assess perceptions of and satisfaction with MCT.

Results

To analyze the quantitative data, we used visual–graphical analysis, a commonly used technique in single-subject designs (Barlow, Nock, & Herson, 2009). For the depression and self-esteem results, the three data points collected pre-MCT were averaged for a baseline score. Similarly, we averaged the three data points collected during MCT and the three, collected post-MCT. This was done, in part, to account for missing data. We then graphed and visually inspected the data, looking for any trends.

For the participant self-report ACQ data, we first averaged the three scores collected pre-MCT as well as the three collected during MCT and the three collected post-MCT. We also averaged the three baseline ACQ parent-report scores. We then calculated a difference score by subtracting a participant's averaged total score (pre-, during, and post-MCT) from his parent's averaged total score collected at baseline. Positive difference scores indicated that the parent rated his/her child as having more autism-related cognitive traits than the child rated himself (i.e., poor metacognition). We used a thematic analysis to examine the qualitative data gathered during the exit interview.

Satisfaction. To assess satisfaction, the first author interviewed all participants and their parents, within two weeks post-MCT. Using open-ended questions, both parents and participants were asked to describe what they learned from MCT and their likes and dislikes regarding the group. Participants also rated how much they liked or disliked certain aspects of the group on a 5-point Likert scale (i.e., 1 represents, 'I did not like it at all' (1) and 5 represents 'I liked it a lot'). Specifically, the youth were asked to rate how much they enjoyed: (1) learning about cognitive differences in ASD (M = 3.38, SD = 0.52, range = 3-4); (2) doing activities (M = 3.78, SD = 0.79, range = 3-5); (3) spending time with other teens with ASD (M = 3.69, SD = 0.96, range = 2-5); and (4) participating in the presentation for parents (M = 3.00, SD = 1.95, range = 1-5).

During the exit interview, participants were asked to expand on their ratings by answering a series of open-ended questions. We asked them what they learned about themselves and if/how learning this information would be helpful for self-advocacy. Five of the participants were able to articulate what they learned about themselves and why this information was important. For example, P-2 stated, "this information will be important for those who are working with me because it would help maybe explain some behaviours which they don't really care for." P-1 explained that the group was important because he wants to get a job in the near future and now, he said, "I can tell them more about myself – I have these challenges and don't be surprised if something, stuff like this, happens. And to do [this], I have to learn more about myself."

We also asked parents what they learned about their children and if/how that information will be helpful in advocating for their children. They were also asked if they felt participating in MCT was a valuable experiences, to list their favourite and least favourite aspects of MCT, and to provide any recommendations on how to improve future MCT groups. The parents' answers were transcribed and subsequently, we completed a paper-and-pencil thematic analysis of the responses. Overall, five themes emerged from the interviews: (1) parents enjoyed having the opportunity to connect with other families; (2) parents appreciated learning new information and/or having information explained in an accessible, individualized manner; (3) parents have used (or are planning to use) the information to better advocate for their children's education; (4) parents recognized new strengths in their sons; and (5) parents acknowledged the importance for sons to connect with other teens with ASD; these themes are presented below in Table 3.5.

Additionally, we compiled a list of suggestions made by parents during the exit interview regarding possible improvements for future MCT groups. Six of the eight parents suggested ways to increase parental involvement, such as handouts containing information that was taught during the group or weekly emails summarizing the session activities and their child's participation. Three parents specifically requested more parent sessions, in part, to function as a support group; however, they noted that these groups should not be mandatory for all parents or occur every week. Other suggestions included:

offering the group in other locations; giving weekly assignments/homework; and targeting motivation as well as metacognition.

Self-Esteem. To assess self-esteem, we utilized the total score form the PHCSCS-2 (Piers & Herzberg, 2002). Each participant's averaged T-scores were graphed and visually inspected. In regard to missing data, three participants only completed the questionnaire five times (i.e., out of a total of nine data collection time points); specifically, P-7 was missing all his data collected during MCT and as such, only his pre- and post-scores are graphed are on Figure 3.1. One participant completed the PHCSCS-2 eight times and the remaining four participants completed all nine administrations.

As seen in Figure 3.1, self-esteem was largely in the average range (i.e., T-score > 40) at baseline. One participant (P-8) demonstrated a considerable increase, but self-esteem was unchanged during and after the intervention for all other participants. Importantly, self-esteem did not decrease as a result of MCT. See Table 3.6 for PHCSCS-2 for participant single subject data.

Depression. Similarly, each participant's averaged CDI2 T-scores were graphed and visually inspected; see Figure 3.2. Two participants were missing more than 50% of the data and as such, we did not interpret their results and did not include them in Figure 3.2. Four participants completed the CDI2 at all nine data collection time points and two participants completed the measure seven times.

Five of the eight group members had scores in the average range (i.e., indicating similar results to those obtained from a sample of typically developing same-aged peers) at baseline, during MCT, and post-training. For P-2, his CDI2 scores were in the "High Average" (i.e., more symptoms than are typically endorsed by same-aged peers) range at two data collection time points (i.e., once at baseline and one at the start of MCT); his scores were consistently in the average range for all other time points. Importantly, overall there is no indication that depression increased as a result of MCT. See Table 3.7 for participant CDI2 single subject data.

Metacognition. To assess self-awareness for each participant, we examined data from the ACQ. Each participant's averaged difference scores (i.e., participant score subtracted from parent score) were graphed and visually inspected: see Figure 3.3. In regard to missing data, the ACQ completion rate was at least 75% for six participants (i.e., missing two or less data collection time points); one participant completed the ACQ six times and one completed the ACQ five times, out of a total of nine. There was no parent-report data missing.

Visual inspection of the graph revealed that the majority of participants (i.e., five of nine) demonstrated no change in metacognition, such that difference scores remained generally consistent across MCT. Three participants demonstrated change in the non-hypothesized direction during MCT (i.e., poorer metacognition over time). Specifically, P-4, P-5, and P-7 showed larger discrepancies in the direction of reporting fewer autism-related cognitive symptoms than their parents during and/or post-MCT intervention. See Tables 3.8 self-report single subject ACQ data.

Discussion

There is a large body of research demonstrating cognitive differences in high functioning individuals with ASD. Despite our knowledge of these differences, cognition is not traditionally a target of intervention. One key cognitive difference of particular importance for the current study is limited self-awareness (e.g., Green et al., 2000;

Koning & Magill-Evans, 2001; & Knott et al., 2006; Lerner et al., 2012; Johnson et al., 2009; Goodman et al., 2014). For people with ASD, cognitive challenges, coupled with limited awareness of these differences, contribute to difficulties in adaptive functioning. Yet, there is no intervention targeting cognitive differences or self-awareness. To address this important gap in ASD treatment options, we developed, piloted, and evaluated a novel intervention for adolescents with ASD (i.e., metacognitive training) based on the work by Wells (e.g., 1995, 2000, 2009) and Moritz, Woodward, and colleagues (e.g., Moritz & Woodward, 2007a; Moritz et al., 2010).

The development of the MCT manual involved having a preliminary draft reviewed by multiple psychologists with expertise in ASD and/or intervention development. After revising the manual based on reviewers' suggestions, our primary objective was to assess participants' satisfaction with MCT. When asked to rate how much they enjoyed different aspects of MCT, participants' responses ranged from neutral to very enjoyable; in particular, the youth most enjoyed the group activities. During the exit interview, across the possible 40 ratings (i.e., five ratings for each of the eight participants), there were only three ratings of "did not enjoy" (i.e., a rating of one or two out of five) and these were for participating in the presentation for parents; that is, two participants did not enjoy practicing for the presentation and one did not like presenting. Overall, the parents were satisfied with MCT. In particular, they enjoyed connecting with other parents and having the opportunity for their sons to socialize with other teens with ASD. They also appreciated learning new, accessible information about ASD. Importantly, at the exit interview, many of the parents reported that they had already used the information they learned to better advocate for their sons. For example, one parent had taken the information to a school meeting to discuss new learning objectives for her son while another parent sought out information about supports/adaptations for post secondary programs.

Our secondary objective was to assess potential adverse affects. In regard to self-esteem, participants' scores remained relatively stable pre-, during, and post-MCT, with the exception of one participant who demonstrated increased self-esteem during and post-MCT. In part, the lack of change for the majority of youth may have been due to the fact that pre-MCT, self-esteem scores were already in the average range and as such, we would not expect significant improvement. Similarly, there were no changes in depression scores during or post-treatment. Importantly, despite the focus on ASD-related cognitive differences and personal challenges, self-esteem did not decrease during or after MCT nor did depressive symptoms increase. The lack of adverse effects is very promising because there is some research suggesting a relationship between awareness of symptoms and depression (e.g., Butzer & Konstantareas, 2003) in individuals with ASD. It has been proposed that greater awareness is associated average to above average cognitive abilities; these characteristics lead some individuals with ASD to better recognize their social isolation/rejection and thus, contribute to co-morbid mental health disorders (e.g., Sterling, Dawson, Estes, & Greenson, 2008; Barnhill, 2001). It is possible that we did not observe adverse effects because: (1) we balanced discussion of personal challenges with discussion of strengths; (2) we did not directly address social skill deficits, friendships, and loneliness; and (3) the MCT group provided a new source of social support, which is a protective factor for self-esteem and mental health issues. Overall, the maintenance of average ratings of self-esteem and minimal depressive symptoms over the course of MCT is a promising finding for future research in self-awareness and self-advocacy in ASD.

Our third objective was to explore whether metacognition changed over the course of the training program. Five participants demonstrated no change in their awareness of cognitive differences, whereas the remaining three showed poorer metacognition over the course of MCT. Overall, these data do not support our expectation that metacognition would increase during and post-MCT. However, there is other evidence to suggest that the participants demonstrated some insight into their cognitive abilities during and after the group. Firstly, all eight participants participated in the parent presentation where they each discussed information about metacognition and cognitive differences in ASD, as well as their own personal cognitive strengths and challenges. As well, during the exit interview that assessed participant satisfaction, five of the eight participants articulated what they had learned in MCT and/or why the information taught was important for self-advocacy. While this qualitative data is promising, it is premature to draw conclusions about the efficacy of MCT. It is unclear whether our limited quantitative results are due to challenges with measurement (e.g., missing data) or to the MCT program. Given that MCT was well received by participants and parents, and that there are some promising findings, further investigations of the efficacy of MCT are warranted.

Lessons Learned: Future Modifications to MCT

As mentioned above, during the exit interviews, some of the parents provided suggestions about how to improve future MCT groups. For example, one parent said, "I think it might be useful for every week to give the parents a quick summary and then when [we] say to [our children] what did you do…we can pry more information." Another mother highlighted the importance of providing parents with more information by stating that with more information, "then there can be some reinforcing on our part." These suggestions were in keeping with the group facilitator's observations. Specifically, the current version of MCT included a single parent session that occurred near the end of the training program. In hindsight, this session would have been more impactful if it were held near the beginning of the program so that parents were informed of and knowledgeable about the content of weekly sessions and could potentially help their children consolidate the information learned during each group. In addition to holding the parent session earlier in the program, it may have been beneficial to provide a weekly update for parents detailing the lesson of the week and how it applied to their child. As such, we strongly suggest that an important change for future iterations of MCT is a heavier parent component.

Additionally, one mother noted an area in which the content of MCT could have been expanded. She said, "I thought the study was wonderful because the premise was good in understanding that there isn't self-awareness. Awareness is one piece of it and motivation is another piece. It's essential. In a pairing between self-awareness and motivation, you may see more in terms of behavioural changes." Researchers have also begun to note the important link between self-awareness and motivation. Verhoeven et al., (2012) explained that "[a]s long as individuals do not see personal behavior that could be improved, they are presumably less motivated to work on improvement of their daily real-world skills" (p. 890). For this pilot study of MCT, we created a common goal, the group presentation. It is possible that by only having this common goal, participants were not sufficiently motivated to address their personal challenges. More time could have been spent exploring the areas in which each participant was struggling and directly linking this to an individualized goal; this may have, in turn, increased their motivation to engage in MCT and apply it to their daily lives. In keeping with the idea of targeting individual needs, it is likely that the reasons behind a lack of motivation seen in some adolescents with ASD are also highly variable. For example, one could speculate that problems with motivation could be related to anxiety, learning and attention difficulties, atypical reward processing, or inability to speculate about the future. As such, future iterations of MCT may benefit from addressing participants' unique challenges and barriers to motivation and change.

Limitations & Future Directions

The most significant challenges in the present study were in the area of quantitative measurement. Completion of questionnaires required approximately 30 minutes every 2 weeks, which was outside of group time. In total, participants were asked to complete the MCT outcome measure nine times. Requiring participants to complete the questionnaires at home likely contributed to burden and subsequently, to the problem of missing data. As well, our measure of metacognition was novel. Although we have good preliminary reliability and validity data (Goodman et al., 2014), the ACQ had not been utilized in an intervention study previously nor has it been used in repeated assessments; thus, there may be difficulties with test-retest reliability. Additionally, to the best of the authors' knowledge, the Piers-Harris Children's Self-Concept Scale has rarely been used with an ASD population. As such, there are no data to suggest that it is a sound measure of self-esteem in youth with ASD. It is promising that our participants scored in the average range, however, an in depth study investigating the utility of the PHCSCS-2 with an ASD population would help further bolster our findings. As well, future research would benefit from identifying more appropriate and sensitive measures to assess change in metacognition and self-esteem over time, ideally in a brief amount of time to limit burden on participants. It may also be helpful to consider completing the outcome measures during session time to ensure completion and to reduce burden on participants.

Furthermore, upon reviewing session notes and videotapes, it was evident that there were unexpected (and unmeasured) benefits of MCT for the participants. For example, we observed strong social cohesion and support amongst the participants. Many of the participants also demonstrated pride in participating in the presentation and expressed a more positive attitude about ASD following participation in the group. Future research should explore ways to measure these types of gains both quantitatively and qualitatively. Lastly, while we recognize that the generalizability of the current study was minimized by a small sample size, we chose a single-subject approach because of the rich, mixed-methods data it was able to provide in these initial stages of MCT development. However, we note that our methodology is not “truly quasi-experimental” (p. 127) because of the lack of randomization (Kratochwill & Levin, 2010).

The current studies established a protocol for targeting self-awareness in youth with ASD, which demonstrated participant satisfaction and other promising findings. The efficacy and specific benefits of MCT will need to be evaluated in a larger study that builds upon the current protocol. A future study should evaluate MCT with a larger group of participants and a more controlled study design, such as a wait-list control. This will allow for group comparisons and will provide more information about the efficacy of

MCT. We are hopeful that with improved methodology, MCT will emerge as another option in our toolbox of ASD interventions. Importantly, we view this approach as having a great deal of potential to address key challenges in high functioning teens and adults with ASD.

Table 3.1 MCT Session Outline

Session	Main Topic	Activities
1	Metacognition	- Introduction to facilitators & group rules - Icebreaker - Metacognition & ASD lesson - Goal setting - Discussion
2	Executive Functioning	- Check-in & icebreaker - Didactic lesson on challenges with planning organization for people with ASD - Interactive activity - Discussion
3	Mental Flexibility	- Check-in & icebreaker - Didactic lesson on the importance of mental flexibility - Interactive activity & role playing - Discussion
4	Big Picture Thinking	- Check-in & icebreaker - Didactic lesson on detailed-focused processing vs. big picture thinking in ASD - Interactive activity - Discussion
5	MCT Review	- Check-in & icebreaker - Review of previous lessons - Discussion of personal strengths/challenges & importance of self-advocacy
6	Preparing for the Presentation	- Check-in & icebreaker - Preparation for presentation - Dress rehearsal
7	Parent Presentation & Graduation	- Parents presentation - Graduation party

Table 3.2 Suggestions from MCT Manual Reviewers

Reviewers	Key Suggestions
Review 1	- Incorporate activities that require communication skills and cooperation
	- Use a parent presentation to consolidate information and reinforce the concept of self-advocacy
Review 2	- Use a ‘difference’ rather than ‘deficit’ framework
	- Recruit older adolescents who may have an easier time grasping the abstract concepts and be more motivated to change
	- Consider that youth with co-morbid ADHD may struggle due to inattention and impulsivity
	- Simplify the language used
Review 3	- Use a visual schedule (along with structured, predictable sessions) to reduce anxiety
	- Simplify the language and replace the academic terms with more meaningful/concrete terms
	- Be prepared with lots of concrete examples of how areas of difference might affect daily life
	- Make the final presentation more focused/structured
Review 4	- Remember to highlight executive functioning strengths
	- Consider reducing the time dedicated to the parent presentation

Note. Minor suggestions, such as grammatical changes, have not been reported.

Table 3.3 Demographic Information

Participant	MCT Group	FSIQ	PIQ	VIQ	CELF Core	CELF Receptive	CELF Expressive	AQ Parent	SRS T-Score
P-1	1	117	130	122	90	105	91	39	88
P-2	1	139	119	148	123	109	122	34	73
P-3	1	119	118	116	108	115	103	28	68
P-4	1	99	89	108	87	99	85	23	90
P-5	2	111	114	107	94	103	89	30	79
P-6	2	119	114	120	123	105	122	28	65
P-7	2	95	97	93	79	96	73	31	79
P-8	2	110	108	102	79	94	80	36	N/A

Note. Estimate IQ assessed by Wechsler Intelligence Scale for Children – III (Wechsler, 2004; FSIQ = full scale; PIQ = performance; VIQ = verbal) or Wechsler Abbreviated Scale of Intelligence (Wechsler, 1999). CELF = Clinical Evaluation of Language – Fourth Education (Semel, Wiig, & Secord; 2003; scores represent core language composite score, receptive language, and expressive language standard scores, respectively. Average standard score is 85-115). AQ = Autism Quotient (Baron-Cohen et al., 2001 & 2006; 30 is the suggested cut-off score for the parent-report adolescent version of the AQ). SRS = Social Responsiveness Scale (Constantino & Gruber, 2005; T-scores of 60 and above represent the clinically significant range). N/A = Not available.

Table 3.4 Cognitive Testing Results

	EFT	ToL TM	ToL TC	ToL TRV	ToL TPST	Trails Scan	Trails Seq	Trails Swt	Trails Speed	WCST PRSS	WCST CC	WCST CC%
P-1	30	90	96	104	110	9	9	10	12	127	6	>16
P-2	30	118	124	≤ 60	96	13	13	12	13	100	3	11-16
P-3	30	106	100	104	108	9	13	12	12	135	6	>16
P-4	26	100	96	≤ 60	110	10	11	5	12	100	6	>16
P-5	30	126	124	104	110	11	6	9	9	93	6	>16
P-6	30	112	106	104	102	7	10	5	7	107	6	>16
P-7	30	84	86	104	70	7	4	7	9	81	3	≤ 1
P-8	30	84	106	≤ 60	108	12	12	10	13	95	5	>16

Note. EFT = Embedded Figures Test (normative $M = 30.4$, $SD = 2.10$; Benton & Spreen, 1969); ToL = Tower of London (TM = total move standard score; TC = total correct standard score; TRV = total rule violation standard score; TPST = total problem-solving time standard score; Culbertson & Zillmer, 2001); Trails = Trail Making Task (Scan = Scanning scaled score; Seq = Letter and Number Sequencing combined scale score; Swt = Switching scaled score; Speed = Motor speed scaled score; Delis, Kaplan, & Kramer, 2001); WCST = Wisconsin Card Sort Task (PRSS = preservative responses standard score; CC = categories completed; CC% = categories completed percentile [>16 = average]; Heaton et al., 1993).

Table 3.5 Parent Satisfaction Themes

Theme	No. of Parents	Example
Connecting with other parents	3	- “A lot of it was stuff I knew but I think the biggest take away for me was meeting the other parents and realizing that there was a commonality there”
Learning new information	5	- “I never really had autism explained in quite that way….to actually pull it out and say the whole executive functioning and this is where things aren’t happening…it was like oh my god, that’s my son. No one had every really put it forth that way so it’s a lot easier to understand and then I guess understand what the limitations are”
Using the information learned in the group	5	- “That was really good because actually right away I went to the school and I was talking about the executive functioning with the counselor there”
Recognition of new strengths in their children	3	- “I think we are quite impressed with the things he admitted to; he is more aware than we thought” - “Actually when they all stood up to give there presentation and I thought P-7 was really forward and seemed really casual standing there. You could really see the difference in the boys and I sort of felt quite proud”
Importance for sons to connect with other teens with ASD	5	- “I liked that he had the opportunity to hang out with a group of guys his own age; that is positive, because there is so little opportunity for it” - “I think it probably did good in the fact that it was good for him to realize that he wasn’t the only one”

Note: The number in the second column represents the number of parents who endorsed the corresponding theme.

Table 3.6 Self-Esteem

	Time 1	Time 2	Time 3	Time 4	Week 5	Time 6	Time 7	Time 8	Time 9
P-1	52	53	53	53	58	60	58	--	56
P-2	40	41	39	40	43	44	46	44	41
P-3	48	48	48	48	48	48	51	50	48
P-4	48	50	48	55	51	52	50	50	48
P-5	42	--	43	44	44	--	--	--	44
P-6	60	50	53	52	53	49	51	53	50
P-7	50	53	56	--	--	--	60	--	45
P-8	--	48	49	60	--	53	66	--	--

Note: Table represents total subscale T-score from the PHCSCS-2 (Piers & Herzberg, 2002). Scores of 40 and above represent the average range. -- indicates measures was not completed by the participant.

Table 3.7 Depressive Symptoms

	Time 1	Time 2	Time 3	Time 4	Week 5	Time 6	Time 7	Time 8	Time 9
P-1	50	44	42	40	40	40	38	42	40
P-2	59	64	55	65	57	50	54	52	54
P-3	55	50	55	54	--	49	50	--	47
P-4	54	50	47	45	42	45	47	47	54
P-5	--	74	--	--	--	--	--	--	--
P-6	49	52	50	52	50	52	52	49	49
P-7	42	38	38	42	38	38	45	--	--
P-8	55	--	57	54	--	--	--	--	--

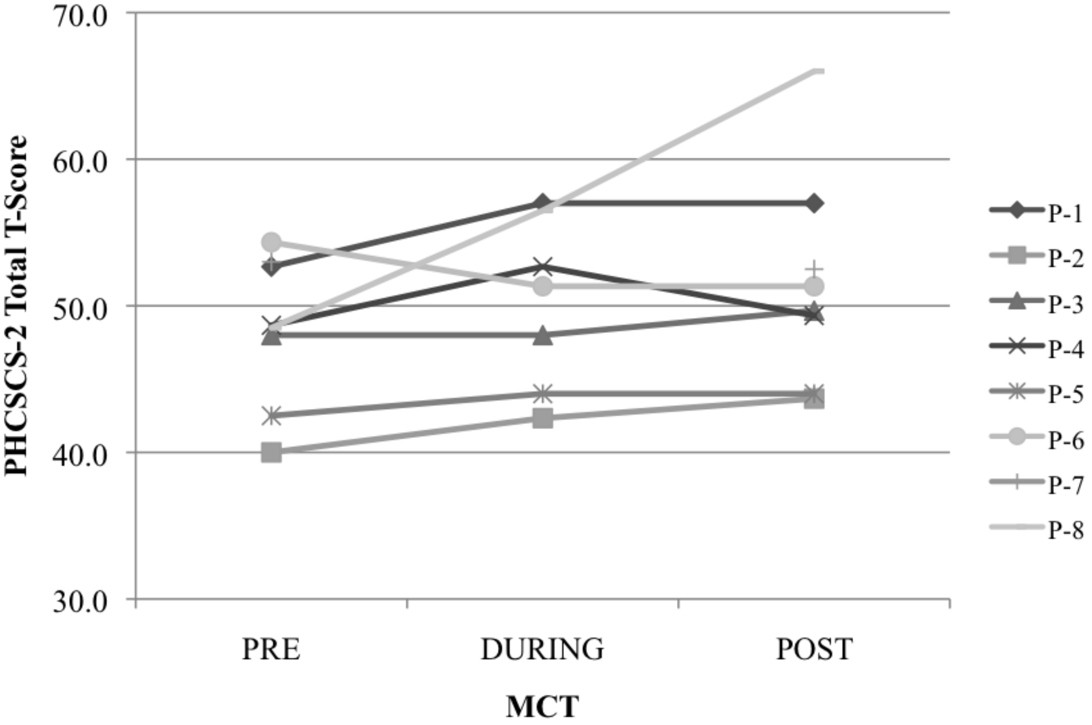
Note: Table represents total subscale T-score from the CDI2 (Kovacs, 2011). Scores of 40-60 are considered within the average range. -- indicates measures was not completed by the participant.

Table 3.8 Metacognition Self Report

	Time 1	Time 2	Time 3	Time 4	Week 5	Time 6	Time 7	Time 8	Time 9
P-1	102	93	91	87	93	93	91	92	91
P-2	92	88	94	81	87	88	90	84	86
P-3	87	89	86	92	92	94	92	--	94
P-4	96	95	85	69	84	79	78	75	95
P-5	91	96	93	98	100	--	--	--	86
P-6	83	84	83	87	86	89	88	82	84
P-7	72	63	57	48	50	--	50	--	47
P-8	--	96	86	88	--	90	92	--	--

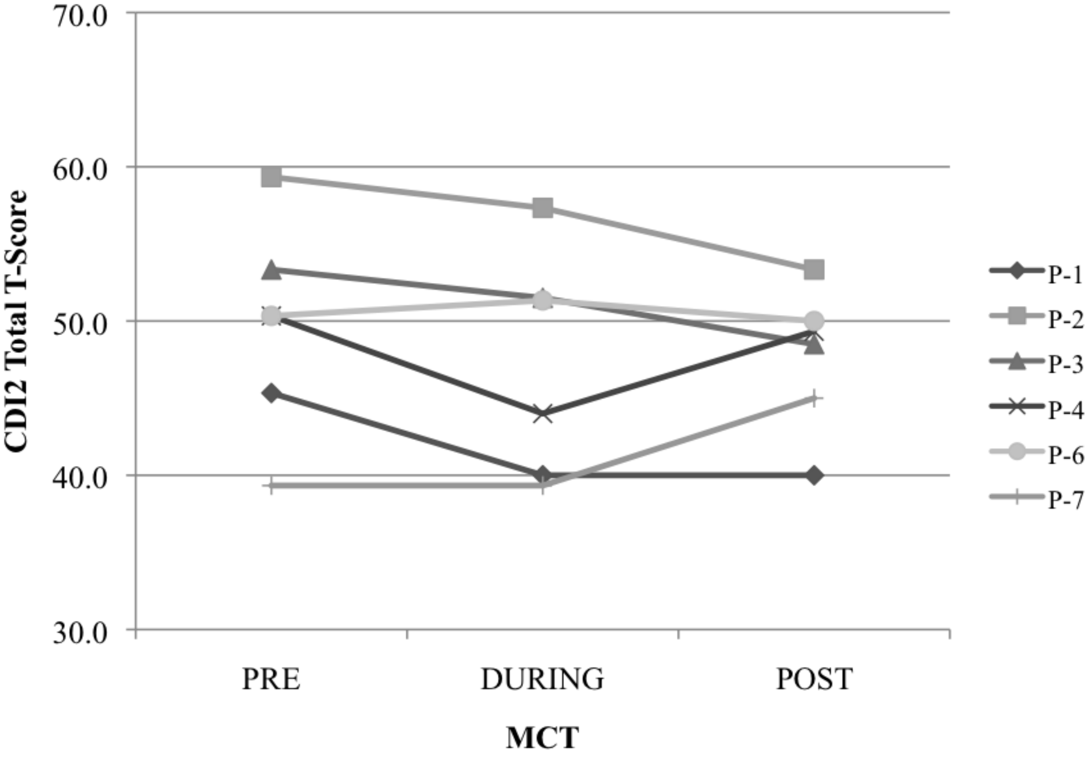
Note: Table represents the self-report ACQ total scores. -- indicates measures was not completed by the participant.

Figure 3.1 Self-Esteem



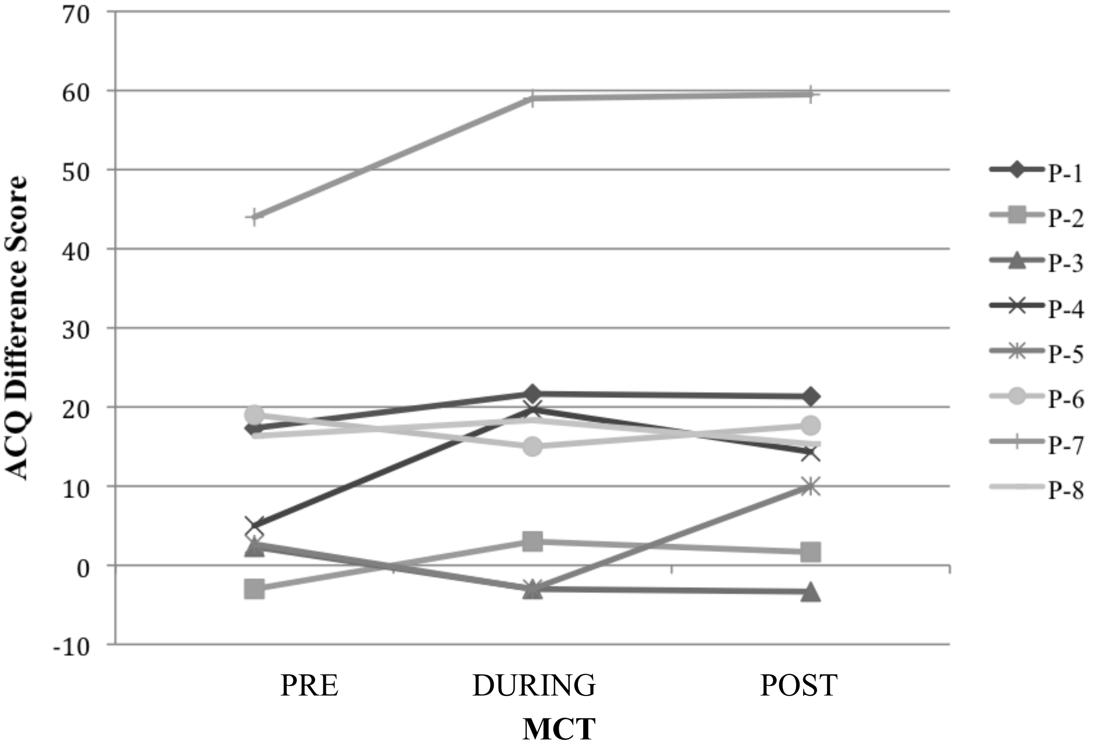
Note: Graph represents total subscale T-score from the PHCSCS-2 (Piers & Herzberg, 2002) pre-, during, and post-MCT. Scores of 40 and above represent the average range.

Figure 3.2 Depressive Symptoms



Note: Graph represents total subscale T-score from the CDI2 (Kovacs, 2011) pre-, during, and post-MCT. Scores of 40-60 are considered within the average range.

Figure 3.3 Metacognition



Note: Graph represents the discrepancy between parent- and self-report ACQ total scores. Zero represents no discrepancy between scores (i.e., good metacognition). Scores above zero indicate that the youth participant reported fewer autism-related cognitive traits than his parent. Scores below zero indicate that the youth participant reported more autism-related cognitive traits than his parent.

CHAPTER 4: GENERAL DISCUSSION

Cognitive differences, including deficits in self-awareness, are common in high functioning individuals with ASD. However, these differences are rarely targeted for intervention despite evidence that awareness of personal strengths and challenges is valuable for daily living, treatment, and self-advocacy. Moreover, there is not a currently available measure of metacognition (i.e., awareness of cognitions) for individuals on the autism spectrum. As such, the primary objectives of this dissertation were to examine and improve metacognition in youth with ASD.

For the studies in Chapter 2, my goal was to develop a questionnaire focused on cognitive traits common in people with ASD and to subsequently evaluate its factor structure and internal reliability. As well, I aimed to provide initial validation for novel measure using a sample of youth with and without ASD and to assess metacognition in high functioning youth with ASD. The Chapter 3 study explored the development of metacognitive training (MCT) for adolescents on the autism spectrum, in order to increase knowledge about cognitive strengths and challenges and develop self-advocacy skills. Specifically, while piloting MCT, I evaluated participant satisfaction, potential adverse effects, and changes in metacognition.

This chapter will elaborate on the findings from the current studies as well as discuss: a) the results in relationship to previous research on metacognition; b) clinical implications; and c) study limitations. At the end of this chapter, future areas of research will be described including next steps for MCT.

Summary of Results

In the first research study, I investigated the development of a novel questionnaire focused on cognitive traits common in people with ASD, including its psychometric properties and application for an ASD population. I performed an exploratory factor analysis on data collected from over 300 undergraduate students who completed the Awareness of Cognitions Questionnaire (ACQ). Results revealed that the questionnaire had four factors, which accounted for 43% of the variance; these factors were then utilized to derive factor scores. Three of the four factor scores and the questionnaire total score had satisfactory internal consistency. Subsequently, in the second study, 20 youth with ASD and 20 typically developing comparisons and their parents completed the ACQ. As hypothesized, parents in the ASD group reported more autism-related cognitive traits in their children (higher ACQ scores) compared to parents in the comparison group. Comparisons of self- and parent-reports indicated that youths with ASD reported significantly fewer autism-related cognitive traits than their parents attributed to them. Over 84% of parents of youth with ASD rated their child higher on the ACQ compared to their child's self-report, while only 11% of parents in the control group demonstrated this same discrepancy. Therefore, in addition to providing initial support for the reliability of the ACQ, these results revealed a lack of self-awareness in youth with ASD in regard to their own cognitive traits.

In the third study, I piloted metacognitive training (MCT) for adolescents on the autism spectrum, with the goals of increasing awareness of cognitive strengths and challenges and fostering self-advocacy skills. I developed the MCT program, which I modeled after the metacognitive therapy program for patients with schizophrenia (Moritz & Woodward, 2007a; Moritz & Woodward, 2007b; Moritz et al., 2010). I created a manual and received input from experts in ASD and/or intervention research. Following the development phase, eight high functioning adolescents with ASD completed the MCT program and a set of evaluation measures. Results revealed that participants rated MCT positively, as did their parents. Importantly, there was no participant dropout or adverse effects as indicated by a lack of change in self-reported depressive symptoms and/or self-esteem. Overall, the youth reported that they most enjoyed the activities while the parents appreciated the social aspects of the group and the accessibility and applicability of the information taught. Metacognition, as measured by the ACQ, did not change over the course of MCT for the majority of participants (i.e., five out of eight), although it is unclear if these results reflect measurement error or ineffectiveness of MCT. All eight group members were able to participate in the parent presentation. Moreover, during the exit interview, five of the eight participants were able to articulate what they had learned in MCT and/or why the information taught was important for self-advocacy. These results indicate that MCT for an ASD population might be quite fruitful, but that some changes to the MCT protocol and study methodology will be necessary. Suggested changes will be discussed in more detail below.

The following discussion integrates these findings with the existing literature and highlights study limitations and areas for future research. An emphasis is placed on clinical implications regarding assessment and intervention in ASD and the future of metacognitive training for this population.

Metacognition: Integration of Findings with Existing Research

Much of the research to date on metacognition and ASD comes from experimental studies. For example, Williams and Happé (2010) assessed awareness of one’s own intentions in ASD and found that compared to matched control children, youth with ASD were significantly less likely to report their own reflexive movements and mistakes as unintentional. They also found that participants with ASD were less able than typically developing youth to report their own previous false beliefs (Williams & Happé, 2009). Moreover, individuals on the autism spectrum have been shown to have difficulty: retelling personal narratives in a coherent and sophisticated manner; conceptualizing themselves with agency or through another's perceptive; recognizing that they have 'first-person privileged' information regarding their own inner states; and generating self-characteristics (e.g., Jackson, Skirrow, & Hare, 2012; Farley, López, & Saunders, 2010; Mitchell & O'Keefe, 2008; Losh & Capps, 2003). In his review article, Williams (2010) referenced these studies, as well as other research, to highlight challenges with metacogniton in ASD. However, no prior study examined how people with ASD understand their own cognitive differences.

As such, to further explore metacognitive deficits in ASD, I developed a novel-self report measure of metacognition and utilized informant discrepancies (De Los Reyes & Kazdin, 2005) to examine awareness of cognitive traits in ASD. Informant discrepancies have been previously used in many studies to show that individuals on the spectrum underreport their autistic symptomatology and over report competencies such as social skills and empathy (e.g. Green, Gilchrist, Burton, & Cox, 2000; Johnson, Filliter, & Murphy, 2009; Knott, Dunlop, & Mackay, 2006; Lerner, Calhoun, Mikami, & De Los Reyes, 2012). Similarly, on the ACQ, youths with ASD reported significantly fewer autism-related cognitive traits than their parents attributed to them. This finding further supports metacognitive deficits in ASD and is consistent with the body of research suggesting poor awareness of symptoms and competencies in youth on the spectrum.

Research from multiple youth clinical populations (e.g., ASD, OCD, ADHD) suggests that awareness of one's own symptoms has significant clinical implications. More awareness is generally associated with better functioning and positive treatment outcomes (Owens et al., 2007; Storch et al., 2008; Lewin et al., 2010; Garcia et al., 2010; Mikami et al., 2010; Verhoeven et al., 2012). However, no prior research has examined remediation of metacognition in ASD. Findings from the MCT study must be interpreted with caution at this stage. Although the quantitative results did not support improvements in metacognition over the course of the intervention, the qualitative data suggested that the participants were able to discuss their cognitive strengths and challenges and explain the importance of this information.

To better understand why I did not consistently observe the anticipated increase in metacognition on the ACQ during and post-training, I looked to the acquired brain injury (ABI) literature. Specifically, I was interested in one component of ABI rehabilitation, that is, increasing awareness of impairments post-ABI and how these impairments interfere with daily functioning. This is an important component of treatment because unawareness of deficits negatively impacts safety, independence, psychosocial functioning, and motivation for, participation in, and efficacy of interventions (Ownsworth & Clare, 2006; Toglia & Kirk, 2000). Toglia and Kirk argue that intervention for awareness of deficits needs to be multifaceted to account for its complexity. As such, many rehabilitation programs for ABI are intensive, multidisciplinary, tailored to the individual client, and include a variety of approaches such as structured learning, adjusting goals, educating families, and modifying the environment (Fleming & Ownsworth, 2006; Ownsworth & Clare, 2006). Moreover, in a review of interventions designed to improve problem solving, planning, and multi-tasking in ABI patients, Kennedy et al. (2008) found that most interventions also incorporated metacognitive strategy instruction, which includes specific step-by-step training for complex tasks.

The ABI rehabilitation literature also provides insight into how to best assess self-awareness pre- and post-intervention. It has been proposed that to successfully measure awareness, researchers/clinicians need to complete an assessment within a task or situation (Toglia & Kirk, 2000). Toglia and Kirk make this suggestion because they argue that awareness includes both long-term memory of metacognitive knowledge (i.e., that which can be captured on a questionnaire) as well as an awareness that is activated as a task is being completed. Moreover, Ownsworth & Clare (2006) state that "a single score or sample of behavior is insufficient for forming an opinion that an individual's awareness is intact or absent, or high or low… it is recommended that a multidimensional approach for measuring awareness be employed in clinical practice and research" (p. 792).

Therefore, the ABI literature provides a very different model for assessment and intervention regarding self-awareness compared to the metacognitive training model used in the current study. Most importantly, the ABI research suggests a need for more comprehensive evaluation of metacognition. According to this approach, assessing metacognitive change with a single questionnaire is an inadequate means of measuring such a complex construct. In regard to intervention, ABI rehabilitation appears to be more intensive in nature and uses more hands-on learning, strategy building, and targets specific functional activities rather than the psychoeducational approach used in MCT.

This is not to say that psychoeducation is not important or useful. Many of the parents and youth who participated in MCT reported that the group was enjoyable and that the information they learned was beneficial for self-advocacy. Importantly, the primary goal of MCT, to increase self-awareness, is different than that of ABI rehabilitation, which aims to improve cognitive abilities. However, despite this critical difference, future iterations of the MCT protocol may be greatly improved by incorporating some ABI rehabilitation strategies (such as individualized goals, modifications to the environment, and teaching step-by-step metacognitive strategies) and by employing a multidimensional approach to measuring outcomes.

Clinical Implications

Self-report. There is now a significant body of literature demonstrating that youth with ASD underreport their own symptomatology as compared to parents and teachers (e.g., Green et al., 2000; Johnson et al., 2009; Knott et al., 2006; Koning & Magill-Evans, 2001; Lerner et al., 2012). As well, experimental research (see Williams, 2010 for review) coupled with the findings from the current dissertation, suggest significant deficits in metacognition in ASD. This is a challenge for professionals who work clinically with individuals on the autism spectrum. Self-report questionnaires and one-on-one interviews to assess mental health status, daily functioning, and treatment progress are used frequently. Researchers have recently raised concerns regarding the use of self-report questionnaires for youth with ASD. For example, Mazefsky, Williams, and Minshew (2008) found a significant lack of correspondence between self-report measures of mental health and parent-reported psychiatric diagnoses in youth with ASD; they attribute their findings, in part, to alexithymia (i.e., some people with ASD have difficulty identifying, understanding, and communicating their own emotions; Berthoz & Hill, 2005). It is therefore critical to weigh the benefits and limitations to using self-report measures, which still hold an important place in clinical practice and research. Importantly, self-report measures allow us to see how individuals on the autism spectrum view themselves and they can provide us with a glimpse into their inner beliefs, attitudes, and emotions. However, these reports will need to be considered alongside information provided by other informants such as parents, teachers, peers, and clinicians. While these other informants are also susceptible to providing inaccurate information, taken together, they may present a more complete picture of the person with ASD.

Furthermore, there is a large body of research examining the use of self-report in assessing childhood psychopathology including if and how informant characteristics, such as age, ethnicity, and gender, influence reporting (see De Los Reyes & Kazdin, 2005 for a review). However, this research only pertains to youth with mental health disorders and not developmental/intellectual disabilities and as such, it is unclear how informant characteristics influence reporting in an ASD population. Like other informant characteristics, one’s degree of self-awareness will also influence responses to self-report measures. Moreover, given the significant heterogeneity of ASD symptoms, it is highly likely that deficits in self-awareness also vary in their pervasiveness, severity, and functional impact. Therefore, additional research needs to explore how to best measure self-awareness deficits in ASD (i.e., the measure needs to be sensitive enough to detect individual differences) as well as how self-awareness may relate to other individual characteristics (e.g., intelligence, ASD symptom severity, age, etc.). More research on this topic specifically targeted for ASD would be invaluable in providing clinicians and researchers with some guidance as to how to best use and interpret self-report measures.

Similarly, informant reports, including teachers and parents, are also influenced by personal characteristics (e.g., stress and psychopathology), as well as biases such as social desirability. Comparison of self- vs. parent/teacher-report is commonly used in the assessment of children and while we often assume that the adult information is more accurate, De Los Reyes and Kazdin (2005) suggest otherwise. For example, research has found that discrepancies between parent and child reports are related to parental psychopathology and stress. De Los Reyes and Kazdin theorize that a parent might interpret his/her child's behaviour through a depression- or stress-related negative bias, thus influencing the accuracy of the parent's report. Moreover, in a recent study, Lerner and colleagues (2012) examined self- and parent-reported social functioning in youth with ASD. Interestingly, in addition to their main results (i.e., parents reported significantly poorer social skills in their children compared to self-reports), Lerner et al. also found that greater informant discrepancies were related to lower parental self-efficacy. The authors proposed that lower self-efficacy and increased stress in parents contribute to lower ratings of functioning in their children.

The use of parent report also poses unique limitations in an ASD population. A large body of research has shown that parents of children with ASD report more parenting stress compared to parents of typical children and parents of children with other developmental disorders (see Hayes & Watson, 2013 for a systematic review). As well, some parents of children on the autism spectrum exhibit traits of the broader autism phenotype (BAP). The BAP refers to the presence of sub-threshold autism symptoms in unaffected relatives of someone with ASD. Of note, the BAP is only present in a subset of relatives; it is more common in families with multiple incidences of ASD, fathers (versus mothers), and at-risk siblings (Bernier, Gerdts, Munson, Dawson, & Estes, 2012; De la Marche et al., 2012; Sucksmith, Roth, & Hoekstra, 2011).

Since the BAP encompasses both social and cognitive impairments (Sucksmith et al., 2011), it can be hypothesized that some parents of children on the spectrum may also have challenges with self-awareness and as such, this may influence how they report information about themselves and their children. Problematically, BAP in parents has also been found to be associated with depression, use of maladaptive coping strategies, less social support, and more parenting stress (Ingersoll & Hambrick, 2011). These characteristics also likely impact how parents report their children's symptoms. Therefore, future research needs to be undertaken to better understand the nature and extent of these limitations so that self- and parent- report can be used most effectively in the ASD population. For example, one of the ways in which this research can be bolstered, is by the use of additional raters such as teachers or clinicians. This approach was undertaken by Koning and Magill-Evans (2001) who used both parent and teacher ratings to assess self-awarenss of social skills in youth with ASD. The discrepancy they found between self- and teacher-reports was consistent with the large body of research suggesting poor self-awareness in youth with ASD, which is largely based on discrepancies between self- and parent-reports (e.g. Green, Gilchrist, Burton, & Cox, 2000; Johnson, Filliter, & Murphy, 2009; Knott, Dunlop, & Mackay, 2006; Lerner, Calhoun, Mikami, & De Los Reyes, 2012). These findings provide preliminary evidence for the accuracy of parent-reports.

Self-awareness and self-concept. The goal of the third study in this dissertation was to develop and pilot a training program that targets self-awareness in adolescents with ASD. While metacognition did not quantitatively improve over the course of MCT, all eight MCT group members were able to participate in a presentation developed for parents. Participants generated a list of personal cognitive strengths and challenges during the MCT sessions leading up to the presentation. As well, during the sessions, the participant engaged in activities that required executive functioning, mental flexibility, and/or big picture thinking. After the activities, participants were asked to reflect upon their performance, noting things that they did well and things that were more challenging for them. With the support of the group facilitators, the participants were able to discuss their strengths and challenges; this process in and of itself required metacognition. Moreover, in a further demonstration of metacognitive abilities, during the post-MCT interview five participants were able to articulate what they had learned in the group and/or why the information taught was important. For example, one participant explained that the information he learned during MCT was particularly important when working with new people (i.e., teachers, employers) because "it [will] help maybe explain some behaviours which they don't really care for." Another participant explained that the group was important because he wants to get a job in the near future and now, he said, "I can tell them more about myself – I have these challenges and don't be surprised if something, stuff like this, happens." In addition to requiring metacognition, these examples also highlight the initial stages of self-advocacy skills for these youth with ASD.

However, in ASD, there is research that suggests a relationship between awareness of symptoms and depression (e.g., Butzer & Konstantareas, 2003). It has been proposed that individuals with ASD and average to above average cognitive ability are better able to recognize their lack of social competency, social isolation/rejection, and loneliness (e.g., Bauminger et al., 2003; Barnhill, 2001; Capps et al., 1995; Sterling et al., 2008; Vickerstaff et al., 2007; White & Roberson-Nay, 2009). As such, self-esteem and depressive symptoms were carefully monitored throughout the course of MCT. I did not observe any adverse effects (i.e., decreased self-esteem or increased depressive symptoms) as the participants learned about their cognitive challenges. These results have significant clinical implications for intervention in ASD, especially those interventions that target self-awareness, social skills, and advocacy.

Research suggests that mental health professionals can play an important role in helping to shape the identities of people on the autism spectrum. To foster positive identity, it has been suggested that professionals should “support the construction of autism as a difference rather than a deficit” (Brownlow, 2010, p. 20). Promoting the development of positive self-concept was part of the reason we chose to pilot MCT with adolescents. Behavioural and neuroimaging research suggests that adolescence is a critical period in the development of self-concept (Sebastian, Burnett, & Blakemore, 2008), yet there is limited availability of resources for teens with ASD, compared to young children. As such, in the MCT protocol, I made a concerted effort to focus on normalizing challenges associated with ASD. Specifically, group facilitators attributed the participants’ challenges to ASD and not to personal weaknesses and also discussed how people without ASD may have similar difficulties. As well, there was ample discussion of personal strengths. It is possible that these discussions helped the participants develop a more positive self-concept (at least in regard to their ASD symptoms) and decreased distress and embarrassment related to their challenges. Moreover, the social nature of the group also helped significantly with normalization. For example, one participant stated during the exit interview “at the very least, I know more people who are in the same boat” and when speaking about his own challenges and strengths, another participant said, “I would not be [myself] if I did not have autism”. Future research investigating the efficacy of MCT should examine self-concept and related outcomes, such as distress due to ASD-related challenges.

Parent perceptions. Information gleaned from the participants’ parents during the exit interviews also provided important information regarding the efficacy of and future directions for MCT. Firstly, I consistently found that the parents used the information taught in MCT to better advocate for their children. For example, one mother said, “we've been building on the work that you've done with [our son] this summer. We put [him] in a camp for 2 weeks …it was a chance for us to talk to him about the importance of social skills. I think all these incremental messages are adding up. I think he is starting to mature and could be in a process of shifting his thinking.” Following MCT, another parent began actively contacting post-secondary schools that support people with disabilities and community resources for adults with ASD. As well, several parents took the information they learned from MCT to their sons’ schools. They talked to teachers and school administrators about providing better accommodations to optimize their son’s learning.

Furthermore, during the exit interviews, several parents expressed significant worry about their son's life after high school. While all of the participants were on track to graduate from high school, parents were concerned about how their son's grades would affect acceptance to post-secondary school and/or whether university, college, or the workforce would accommodate their son's needs (i.e., especially in regards to executive functioning deficits). Importantly, the concerns expressed by the parents were not unfounded. In their review of the adulthood outcome literature, Levy and Perry (2011) noted that only approximately a quarter of individuals with ASD who complete mainstream high school education find work. However, this work is often unstable and of low status and, subsequently, many of these individuals live at home and are highly dependent on their parents.

It was evident from listening to the parents that while MCT helped them recognize and normalize their son's cognitive challenges, they also have additional needs regarding advocacy and transition planning. Although beyond the scope of MCT, more research and resources need to be dedicated to transition planning and adult outcomes in ASD. Ideally, this research will become more multidisciplinary in nature, including professionals from education, occupational therapy, and mental health. Subsequently, research could then help inform the private sector, college/university educators, and community partners in creating more supportive post-secondary and work environments.

Knowledge translation. One of the main goals of metacognitive training for schizophrenia, as proposed by Moritz, Woodward, and the Metacognition Study Group, was knowledge translation (KT). Specifically, the program was designed to translate research findings about cognitive deficits into a format that would be informative and helpful for individuals with schizophrenia. The Canadian Institutes of Health Research defines KT as “a dynamic and iterative process that includes synthesis, dissemination, exchange and ethically-sound application of knowledge to improve the health of Canadians, provide more effective health services and products and strengthen the health care system.” KT is also part of the objectives of the Canadian Psychological Association. However, it is widely acknowledged that professionals in the field of psychology are better at sharing research findings amongst the scientific community rather than providing that knowledge to the public and policy-makers (Cohen, Lee, & McIlwraith, 2012). Specifically, a common form of KT, in psychology and other fields, is the publication of research studies in academic journals. However, this method of disseminating research findings has important limitations. Front-line clinicians, patients, and other stakeholders often do not have access to these journals, the background knowledge to understand the results, the time to read and synthesize the material, and/or the ability and resources to implement ideas gleaned from the research.

Therefore, KT was forefront in my thinking during the development of MCT. There is an abundance of research on cognitive differences in ASD but it is unclear if and how this research is disseminated to the community at large. In the field of psychology, cognitive abilities are sometimes assessed during individual psychoeducational or neuropsychological assessments; typically, the findings are then comprehensively explained to families and teachers and lead to appropriate accommodations for the youth. However, cognitive difficulties are rarely targeted directly for intervention. As such, a goal of MCT was to directly convey research findings to families and youth in the form of psychoeducation and to then use this knowledge as the foundation for working toward developing self-awareness and self-advocacy in the domain of cognition.

Moreover, I developed MCT for adolescents and young adults. As discussed above, adolescence is a period of changes in self-concept, increased metacognitive demands, and transition out of the school system. As well, I chose this age group because there are limited interventions available for teens and adults that target core features of ASD. A review of research on psychosocial interventions for adults with ASD revealed that the majority of interventions available focus on reducing undesirable behaviour or social skills training (Bishop-Fitzpatrick, Minshew, & Eack, 2013). There is only a very small number of intervention studies that target other areas of adaptive and self-help skills such as academic, vocational, and leisure skills (Cappadocia & Weiss, 2011; Flynn & Healy, 2012; Palmen, Didden, & Lang, 2012; Rao, Beidel, & Murray, 2008).

The MCT program employed in this study was, in part, developed to address the paucity of intervention available for adolescents and adults on the autism spectrum. Specifically, in the MCT protocol, cognitive differences are explained in an easily accessible manner so that the information can be distributed to a lay audience. The manual was designed with a broad range of mental health clinicians and educators in mind so that professionals from a wide variety of backgrounds can facilitate MCT. This was accomplished by avoiding the use of jargon and specialized therapeutic techniques in the MCT protocol and accompanying materials. Moreover, I designed the intervention to be cost effective; group interventions decrease costs compared to individual intervention and the MCT protocol requires minimal equipment/material. As such, it is my hope that MCT will prove to be a valuable KT tool as well as an efficacious training program.

Limitations

Sample. The goal of the first study was to develop and evaluate a novel questionnaire that assesses metacognition in individuals with ASD. A large sample size (>300) was required to assess the factors in the questionnaire and internal reliability. As such, the participants for the exploratory factor analysis were undergraduate students, chosen because of this need for a large sample size. This sample was predominantly in their 20s and the majority (72 %) was female, compared to participants in the remainder of the dissertation who were mostly male adolescents. Despite the use of an undergraduate sample for the factor analysis, the resulting four factors were very much in keeping with known areas of cognitive differences in ASD and as such, contribute to the validity of the ACQ. To further assess validity, I conducted a follow-up study using parent-child dyads with and without ASD. This approach was fruitful in that it demonstrated parent-child discrepancy scores indicative of poor self-awareness in youth with ASD. However, I recognize that these discrepancy results do not provide validation of the ACQ factor structure for an ASD population.

Ideally, future investigations of the ACQ will include a confirmatory factor analysis using youth and/or adults on the autism spectrum. However, this will still be challenging given that confirmatory factor analysis also requires a large sample size. Sample size is a common issue in ASD research. To recruit a large group of participants with ASD, labs often need to collaborate with others around the country and/or recruit via the Internet. While I may have been able to gather a large number of ASD participants by recruiting and gathering questionnaire data via the Internet, this method is also problematic. Using this recruitment method, researchers lose some control over who completes their questionnaire.

Limitations related to sample were also present in the MCT pilot study. The eight participants were fairly homogenous in regard to characteristics such as age, intellectual ability, language ability, and autism severity. Thus, it is not possible to draw conclusions about the generalizability of MCT for individuals across the autism spectrum. Given the small sample size and the homogeneity of the participants, this study provides little information about who may benefit most from the MCT program. Future studies should explore how participant characteristics influence the efficacy of MCT. Moreover, some of the MCT participants had comorbid ADHD and/or learning disorders and these disorders are associated with difficulties with attention, executive functioning, and learning. As well, we excluded participants who had a current diagnosis of an anxiety or depressive disorder. We did this because of the potential relationship between mental health disorders and self-awareness; we were concerned that participants with preexisting depression and anxiety may be at higher risk of adverse effects. As such, future research will also need to assess the efficacy of MCT for individuals with ASD and a range of comorbid disorders.

Measurement. A significant limitation of the MCT pilot study was the quantitative measurement of metacognition. Although the work of Moritz and Woodward (2007b) guided the development of my protocol, I opted to take a different approach to outcome measures. In their first published study, Moritz and Woodward (2007b) assessed feasibility, adherence, and subjective efficacy of their intervention using the frequency of unattended sessions per patient and feedback on an anonymous, 10-question survey that had participants rate statements such as “The training was useful and sensible” and “A lot of what I learned during training is useful to my daily routine”. In future efficacy studies, researchers primarily measured metacognition via participants’ reports of their distress, preoccupation with, and conviction in their delusions and hallucinations (e.g., Moritz et al., 2011; Favrod et al., 2011). In general, I employed a more thorough assessment of outcome measures than that collected in the initial stages of metacognitive training for schizophrenia.

With the approach I chose, I uncovered many limitations in my assessment of metacognition over the course of the study. Firstly, as highlighted in the ABI literature, it is challenging to capture self-awareness using a single score. Rather, a multidimensional approach including multiple questionnaires as well as assessing metacognition during the context of a task may have yielded more valuable information. Moreover, there is no universal definition of what constitutes a change in metacognition. For example, if you tell someone a previously unknown fact about him/herself (e.g. “You are good at organization”) has his/her self-awareness increased or does that information have to be internalized, incorporated into one’s self-concept, and result in observable behaviour to reflect a legitimate change? In the memory literature, researchers argue that knowing an event happened and reporting the details (i.e., semantic memory) differs from remembering a personal experience (i.e., episodic memory) and that only the latter requires metacognition (Perner, 2000). Therefore, we can speculate that knowing a fact about one’s self and repeating said fact does not require metacognition. This raises important questions regarding the measurement of self-awareness in the current dissertation as well as for future research. Interpretation of the ACQ data was further complicated by the issue of missing data. To interpret the findings (accounting for missing data), I averaged scores across time points (pre-, during, and post-MCT). With this approach, only three participants showed a change in ACQ discrepancy score greater than five points from pre- to post-MCT. Three participants had an increase in discrepancy score indicating a decrease (i.e., poorer) in metacognition across MCT. The remaining five participants did not demonstrate any change in discrepancy score and as such, overall, there is no trend in the data suggesting a positive change in metacognition due to MCT.

In contrast to the ACQ data, several (5 of 8) participants were able to articulate the information they had learned in MCT, including their own cognitive strengths and challenges, during the parent presentation and satisfaction exit interview. This suggests that there may have been change in self-awareness that was not captured with the ACQ. It is important to acknowledge, however, that I cannot compare these qualitative findings to baseline measures and as such, cannot assess whether a true ‘change’ in metacognition occurred. To the best of my knowledge, there is no published research that has specifically targeted metacognition in ASD and no commonly used measure of self-awareness. This gap in the literature made it necessary to develop the ACQ and points to a significant need for future research in the area.

Further complicating the quantitative evaluation data of MCT was the repeated nature of our time-series design. This methodological design required participants to complete the ACQ and the measures of self-esteem and depression nine times. These measures were frequently administered (every two weeks), time consuming (approximately 30 minutes), and were completed at home. It was evident that repeated data collection significantly increased participant burden and resulted in a substantial amount of missing data, thus impacting interpretability of the results. Moreover, the validity of administering these measures repeatedly is unclear. Specifically, it is not known if the ACQ, CDI2, and PHCSCS-2 were sensitive enough to detect change over the 18 weeks they were administered and moreover, responses during repeated administrations may have been affected by participants' previous exposure to the questions and their own past responses. Therefore, in addition to considering alternative measures of self-awareness and adverse effects, future MCT research should include a less burdensome methodological design. For example, it would be worthwhile to find brief assessment measures that can be completed during group so that they do not require additional time at home.

Upon reflection of these limitations, it is evident that the results could have been greatly enhanced by the inclusion of other outcome measures beyond self-esteem, depressive symptoms, self-awareness, and participant satisfaction. While outside the scope of the current project, a potential follow-up study could include video coding of the recorded MCT sessions. Some participants provided little information during the satisfaction exit interview and/or did not complete all of the outcome measures. Video coding may provide a sensitive, but less burdensome measure of some outcomes of interest. For example, transcribed MCT sessions could be used to assess the level/amount of participant engagement (i.e., how often did he actively participate in activities or discussion) as well as participant enjoyment. It may also be possible to use the videotaped sessions to assess participants' learning of concepts during the group. Lastly, some of the participants formed positive relationships with the group facilitators and each other. A measure of social cohesion and facilitator-therapist rapport could have helped capture the benefits of MCT.

Methodology. The MCT pilot study also had a significant methodological limitation. The study's main focus was development and piloting of MCT rather than evaluation of efficacy. As such, I chose the single-subject design because it allowed me to gather a large amount of mixed-methods, exploratory data. It also afforded flexibility with participant recruitment and the timing of MCT groups. Moreover, given the population of adolescents with ASD in Halifax who participate in research, it was highly unlikely that I would have been able to successfully recruit a large enough sample size to undertake statistical group comparisons. However, this approach did not allow for multiple baselines or a control group.

Without a control group, I cannot determine whether participant satisfaction was due specifically to MCT or to more common factors associated with intervention. There is a longstanding body of research that suggests that common factors present in bona-fide interventions are the agents of change rather than the unique characteristics of a specific therapeutic approach. Examples of common factors relevant to MCT are: therapist-client alliance; experiencing mastery; and client expectations (e.g., Messer & Wampold, 2002; Weinberger, 1995). In addition to these factors, MCT provided participants with the opportunity to engage in fun activities outside of home or school, to socialize with peers, and to engage in positive discussion about oneself. As such, these general factors (rather than the specific MCT protocol) could have resulted in the positive qualitative findings.

It may have been more fruitful if we had adopted the methodological design used frequently by Moritz, Woodward and the Metacognitive Study Group. In evaluating metacognitive therapy for schizophrenia, their research team published comparisons between the MCT group and a control group such as a cognitive remediation group, newspaper discussion group, or a wait-list control group (Moritz & Woodward; 2007b; Aghotor et al., 2010; Kumar et al., 2010; Moritz et al., 2011). For our current study, it is likely that a control group in which participants engaged in social activities would have improved the interpretability of the findings; however, this was beyond the scope of the current project and would have been difficult given the large number of participants required. As well, other techniques could have been adopted to improve methodological rigor. For example, Kratochwill and Levin (2010) discuss how to incorporate randomized experimental designs into single-case intervention research. While many of the designs they suggest would not have worked for the current study (e.g., multiple baselines can not be used for a group intervention), incorporating randomization along with a control group would have greatly improved the study and should be used in future research examining the efficacy of MCT.

Another methodological limitation pertained to my dual role as both sole evaluator of MCT and primary group facilitator. This dual role presents a conflict of interest as I was invested in the outcome of MCT (given that I developed the protocol and facilitated the groups), which could have created an unintentional bias in my evaluation of the program. Moreover, because I also conducted the exit interviews, MCT participants and their parents may have exhibited a social desirability bias (i.e., responded in a such a way as to please me). Future research of MCT should utilize different people for the clinician and researcher roles. More specifically, methodological rigor can be increased significantly by having both a control group as well as ‘blind’ evaluators (i.e., researchers are unaware of who received MCT vs. the waitlist control); this will reduce the possibility of biased evaluations. Additionally, satisfaction ratings can be gathered anonymously from participants to reduce the potential for social desirability bias and increase the quality of data gathered.

Motivation: An Important Area for Future Research

As suggested in the ABI literature, a lack of self-awareness significantly interferes with motivation to engage in intervention, so much so that Motivational Interviewing (MI) has been used with ABI patients to increase treatment adherence (Medley & Powell, 2010). Motivation was not perceived to be a major limitation for the MCT group members, in part, because the protocol included fun activities, snacks, and time to socialize. However, the parents of our group members commonly discussed problems with motivation in their sons; for example, one parent said, “awareness is one piece of it and motivation is another piece. It’s essential. In a pairing between self-awareness and motivation, you may see more in terms of behavioural changes”.

During the MCT exit interview, several parents expressed concerns about their son’s academic performance; these conversations often occurred alongside discussion of transition planning and post-secondary education. The parents often expressed frustration because their sons were not achieving at a level consistent with their intellectual abilities. For the most part, parents’ school concerns fell into one of three categories: (1) their son was not engaged in the material taught at school and therefore, not participating in class or completing the work required; (2) their son was excelling in the classes they enjoyed but significantly struggled in all other classes or (3) their son enjoyed school but was not motivated to do any of the work.

Importantly, the struggles with academics were not unique to the MCT participants. Research suggests that there is significant variability in academic performance in high functioning youth with ASD, ranging from above to far below average (see Whitby & Mancil, 2009). Similarly, it is likely that the reasons behind poor academic performance seen in some adolescents with ASD are also highly variable. As the parents of my participants suspected, motivation may play an important role in academic performance. However, poor academic performance could also be attributed to: anxiety related to schoolwork, peer interactions, and transitions; lack of awareness of the repercussions of failure, including social stigma; comorbid disorders such as ADHD and learning disabilities; and significant deficits in executive functioning. As such, while motivation is probably a contributing factor to academic success, it is more likely a combination of these factors that contribute to the variable school performance across high functioning individuals on the autism spectrum.

There is a small body of research looking at motivation to work in individuals with disabilities. In a study of 200 people with intellectual disabilities, Rose, Saunders, Hensel, and Kroese (2005) found that motivation was a significant predictor of employment outcome. In this population, motivation has been found to be related to prospects of monetary gain, social factors, and self-perception of competence. As well, worries regarding bullying and stigmatization in the workforce significantly hinder motivation as does low self-esteem and a lack of support, all of which are common challenges facing those with disabilities (Andrews & Rose, 2010). Future research should begin to explore similar issues in individuals with ASD and expand their inquiries to include motivation for work, post-secondary education, and high school academic achievement.

Given that motivation can interfere with learning and achievement for people with disabilities, examining participant motivation may have been an interesting addition to the current dissertation. It became evident after the completion of MCT, that teaching individuals with ASD about their strengths and challenges and how to self-advocate is only a first step. It would have been useful to also assess if and in what contexts the participants were motivated to apply the information learned in MCT to their day-to-day lives.

As noted above, one therapeutic technique for addressing motivation is MI. In addition to being used with adult patients (Medley & Powell, 2010), there is growing research investigating the efficacy of MI for a number of adolescent clinical populations, in particular substance use, easting disorders, and chronic medical conditions. The goal of MI is to collaboratively support a teen's autonomy and intrinsic motivation for change (Naar-King, 2011). Recently, researchers have started to examine the efficacy of using MI to decrease dropout rates of individuals with severe mental health problems enrolled in post-secondary education; preliminary evidence suggests that MI may be beneficial in reducing barriers to completing post-secondary education (Manthey, 2011). To the best of my knowledge, MI has not been used with individuals on the autism spectrum, despite its potential benefits. Moreover, MI could be incorporated alongside MCT (or other interventions) to help increase participants' motivation to use their knowledge and advocacy skills at school and in the workforce.

Next Steps for MCT

Despite inconclusive findings, I believe that MCT is worth pursuing in the future. However, there are a number of changes to be considered, as outlined above. Specifically, there are four key changes I would make in the next iteration of this intervention. Firstly, the current version of the MCT protocol included activities that were utilized to help participants explore their cognitive strengths and challenges. Given that the participants reportedly enjoyed theses activities, they could have been used further in helping develop metacognition. For example, participants could have been required to repeat each activity. On the second attempt, the participants could be given step-by-step coaching from the group facilitators about how to use their newly learned metacognitive knowledge to complete the activity with more success. A similar approach, called metacognitive strategy instruction, has been used successfully in ABI rehabilitation. Patients are explicitly taught how to "identify an appropriate goal and predict their performance in advance of the activity, identify possible solutions based on their general predictions (one of which will work based on past experience), self-monitor or assess their performance during an activity, and change behaviour by choosing a strategy (i.e., use self-control) if, through self-assessment, the goal has not been met" (Kennedy et al., 2008, p. 271). This approach may have helped increase participants' awareness of the importance of metacognition and the value of their self-knowledge and self-reflection.

Secondly, group members may have benefited if these metacognitive strategies and discussion of strengths and challenges had occurred outside of the MCT group in everyday activities and events. To this end, future iterations of MCT should include a heavier parent component. Parental involvement is critical to the intervention process for youth. As such, a larger parent component could have increased efficacy by equipping parents with the knowledge and skills to help their children reinforce lessons learned in MCT and apply the skills at home during and after MCT completion. As well, MCT could also include teaching them ways in which they can help their children build metacognition at home, thus further reinforcing lessons learned in group.

Thirdly, as mentioned in the section above, the MCT may be improved with the addition of strategies to increase participant motivation. This could include using motivational interviewing strategies to help participants explore the consequences of poor self-awareness and/or the barriers to and positive outcomes of using more metacognition in their daily lives. As well, it is possible that setting individualized goals could have increased motivation. While the group presentation was an important step in self-advocacy, it may have not been an ideal goal for the MCT group because it lacked direct applicability to the participants' daily lives. Individualized goals, possibly alongside the group presentation, could thus be quite advantageous.

Lastly, the qualitative findings from the MCT evaluation suggest that parents and some of the youth recognized the importance of the information they learned in MCT for advocacy. Self-advocacy can be particularly difficult for people on the autism spectrum because it requires, often nuanced and skilled, social communication. As such, including sessions that teach participants how to advocate for themselves would likely enhance future MCT protocols significantly. This could include using strategies such as role-playing and developing scripts for how to explain ASD-related challenges to teachers, employers, etc. Advocacy could also be incorporated into the parent component of MCT as I found that even in late adolescence, many parents were still actively advocating for their sons, especially in regards to education.

Concluding Remarks

In summary, the studies discussed herein provide evidence for deficits in metacognition in youth with ASD and the potential benefits of a novel intervention to target these deficits and improve self-advocacy. Many intriguing questions remain regarding the causes of and factors related to self-awareness in ASD and how to best improve these deficits so that they do not interfere with quality of life. This dissertation provides promising findings regarding assessment and intervention of self-awareness and has critical implications for fostering successful transitions from adolescence to adulthood for those with ASD.

REFERENCES

Aghotor, J., Pfueller, U., Moritz, S., Weisbrod, M., & Roesch-Ely, D. (2010). Metacognitive training for patients with schizophrenia (MCT): feasibility and preliminary evidence for its efficacy. *Journal of behavior therapy and experimental psychiatry*, *41*(3), 207–11. doi:10.1016/j.jbtep.2010.01.004

Algozzine, B., Browder, D., Karvonen, M., Test, D. W., & Wood, W. M. (2001). Effects of Interventions to Promote Self-Determination for Individuals With Disabilities. *Review of Educational Research*, *71*(2), 219–277. doi:10.3102/00346543071002219 American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders, text revision (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders, text revision (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Washington, DC: American Psychiatric Association.

Andrews, A., & Rose, J. L. (2010). A Preliminary Investigation of Factors Affecting Employment Motivation in People With Intellectual Disabilities. *Journal of Policy and Practice in Intellectual Disabilities*, *7*(4), 239–244. doi:10.1111/j.1741-1130.2010.00272.x

Baldwin, W. (2000). Information no one else knows: The value of self-report. In A. A. Stone, J. S. Turkkan, C. A. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), The science of self-report: Implications for research and practice. Mahwah, NJ: Lawrence Erlbaum Associates.

Bares, C. B. (2011). Emerging Metacognitive Processes During Childhood: Implications for Intervention Development with Children. *Child and Adolescent Social Work Journal*, *28*(4), 291–299. doi:10.1007/s10560-011-0233-1

Barlow, D.H., Nock, M.K., & Hersen, M. (2009) *Single Case Experimental Designs: Strategies for Studying Behavior Change*, *Third Edition.* Boston, MA: Allyn & Bacon.

Barnard-Brak, L., & Fearon, D. D. (2012). Self-Advocacy Skills as a Predictor of Student IEP Participation among Adolescents with Autism. *Education and Training in Autism and Developmental Disabilities*, *47*(1), 39–47.

Barnhill, G. P. (2001). Social attributions and depression in adolescents with Asperger syndrome. *Focus on autism and other developmental disabilities*, *16,* 46–53.

Baron-Cohen, S. (2006). The hyper-systemizing, assortative mating theory of autism. *Progress in neuro-psychopharmacology & biological psychiatry*, *30*(5), 865–72. doi:10.1016/j.pnpbp.2006.01.010

Baron-Cohen, S., Hoekstra, R. A., Knickmeyer, R., & Wheelwright, S. (2006). The Autism-Spectrum Quotient (AQ)—adolescent version. *Journal of Autism and Developmental Disorders, 36,* 343–350.

Baron-Cohen, S., & Wheelwright, S. (2004). The empathy quotient: An investigation of adults with Asperger syndrome or high functioning autism, and normal sex differences. *Journal of Autism and Developmental Disorders, 34,* 163–175.

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): Evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders*, *31*(1), 5-17.

Bartlett, M.S. (1950). Tests of significance in factor analysis. *British Journal of Psychology (Statistics Edition), 3,* 77-85.

Bauminger, N., Shulman, C., & Agam, G. (2003). Peer interaction and loneliness in high-functioning children with autism. *Journal of autism and developmental disorders*, *33*(5), 489–507.

Beart, S., Hardy, G., & Buchan, L. (2004). Changing Selves: a Grounded Theory Account of Belonging to a Self-advocacy Group for People with Intellectual Disabilities1. *Journal of Applied Research in Intellectual Disabilities*, *17*(2), 91–100. doi:10.1111/j.1360-2322.2004.00186.x

Bell, V., Halligan, P. W., & Ellis, H. D. (2006). Explaining delusions: a cognitive perspective. *Trends in Cognitive Sciences*, *10*(5), 219–26. doi:10.1016/j.tics.2006.03.004

Benton, A.L., & Spreen, O. (1969) *Embedded Figures Test: Manual of Instructions and Norms.* University of Victoria. BC

Bernier, R., Gerdts, J., Munson, J., Dawson, G., & Estes, A. (2012). Evidence for broader autism phenotype characteristics in parents from multiple-incidence autism families. *Autism Research*, *5*(1), 13–20. doi:10.1002/aur.226

Berthoz, S., & Hill, E. L. (2005). The validity of using self-reports to assess emotion regulation abilities in adults with autism spectrum disorder. *European Psychiatry*, *20*(3), 291–8. doi:10.1016/j.eurpsy.2004.06.013

Bishop-Fitzpatrick, L., Minshew, N. J., & Eack, S. M. (2013). A systematic review of psychosocial interventions for adults with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *43*(3), 687–94. doi:10.1007/s10803-012-1615-8

Blotnicky-Gallant, P., Costain, E., & Corkum, P. (2013). Evaluating a Demystification Program for Adolescents with ADHD. The ADHD Report, 21(8), 1-6.

Brown, S. M., & Bebko, J. M. (2012). Generalization, overselectivity, and discrimination in the autism phenotype: A review. *Research in Autism Spectrum Disorders*, *6*(2), 733–740. doi:10.1016/j.rasd.2011.10.012

Brownlow, C. (2010). Presenting the self: negotiating a label of autism. *Journal of Intellectual and Developmental Disability*, *35*(1), 14–21. doi:10.3109/13668250903496336

Butzer, B. & Konstantareas, M.M. (2003). Depression, temperament, and their relationship to other characteristics in children with Asperger's disorder. *Journal of Developmental Disabilities*, *10*(1), 67-72.

Caldwell, J. (2010). Leadership development of individuals with developmental disabilities in the self-advocacy movement. *Journal of intellectual disability research, 54*(11), 1004–14. doi:10.1111/j.1365-2788.2010.01326.x

Canadian Institutes of Health Research. About knowledge translation. http://www.cihr-irsc.gc.ca/e/29418.html.

Cappadocia, M. C., & Weiss, J. a. (2011). Review of social skills training groups for youth with Asperger Syndrome and High Functioning Autism. *Research in Autism Spectrum Disorders*, *5*(1), 70–78. doi:10.1016/j.rasd.2010.04.001

Capps, L., Sigman, M., & Yirmiya, N. (1995). Self-competence and emotional understanding in high-functioning children with autism. *Development and Psychopathology*, *7*(01), 137–149. doi:10.1017/S0954579400006386

Carruthers, P. (2009). How we know our own minds: the relationship between mindreading and metacognition. *Behavioral and Brain Sciences*, *32*(2), 121–138; discussion 138–182. doi:10.1017/S0140525X09000545

Cartwright-Hatton, S., & Wells, A. (1997). Beliefs about worry and intrusions: the metacognitions questionnaire and its correlates. *Journal of Anxiety Disorders,* 11, 279–296.

Cohen, K. R., Lee, C. M., & McIlwraith, R. (2012). The psychology of advocacy and the advocacy of psychology. *Canadian Psychology/Psychologie canadienne*, *53*(3), 151–158. doi:10.1037/a0027823

Constantino, J. N., & Gruber, C. P. (2005). The Social Responsiveness Scale. Los Angeles, CA: Western Psychological Services.

Costello, A. B. & Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment Research & Evaluation*, *10*(7), 1-9.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.

Culbertson, W., & Zillmer, E. A. (2001). *Tower of London.* Drexel University. Chicago: Multi-Health Systems.

De la Marche, W., Noens, I., Luts, J., Scholte, E., Van Huffel, S., & Steyaert, J. (2012). Quantitative autism traits in first degree relatives: evidence for the broader autism phenotype in fathers, but not in mothers and siblings. *Autism*, *16*(3), 247–60. doi:10.1177/1362361311421776

Delis, D. C., Kaplan, E., & Kramer, J. H. (2001). *Delis-Kaplan Executive Function System (D-KEFS)*. San Antonio, TX: The Psychological Corporation.

De Los Reyes, A. & Kazdin, A.E. (2005). Informant discrepancies in the assessment of childhood psychopathology: A critical review, theoretical framework, and recommendations for further study. *Psychological Bulletin, 131,* 438-509.

Dykens, E.M. & Lense, M. (2011). Intellectual disabilities and autism spectrum disorder: A cautionary note. In D.G. Amaral, G. Dawson, & D.H. Geschwind (Eds.), Autism spectrum disorders Oxford: Oxford University Press.

Endedijk, H., Denessen, E., & Hendriks, A. W. (2011). Relationships between executive functioning and homework difficulties in students with and without autism spectrum disorder: An analysis of student- and parent-reports. *Learning and Individual Differences*, *21*(6), 765–770. doi:10.1016/j.lindif.2011.07.016

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4,* 272-299.

Farley, A., López, B., & Saunders, G. (2010). Self-conceptualisation in autism: Knowing oneself versus knowing self-through-other. *Autism*, *14*(5), 519–530. doi:10.1177/1362361310368536

Farley, M. a, McMahon, W. M., Fombonne, E., Jenson, W. R., Miller, J., Gardner, M., Block, H., et al. (2009). Twenty-year outcome for individuals with autism and average or near-average cognitive abilities. *Autism research : official journal of the International Society for Autism Research*, *2*(2), 109–18. doi:10.1002/aur.69

Favrod, J., Maire, A., Bardy, S., Pernier, S., & Bonsack, C. (2011). Improving insight into delusions: a pilot study of metacognitive training for patients with schizophrenia. *Journal of advanced nursing*, *67*(2), 401–7. doi:10.1111/j.1365-2648.2010.05470.x

Field, S., Sarver, M. D., & Shaw, Stan, F. (2003). Self-Determination: A key to success in postsecondary education for students with learning disabilities. *Remedial and Special education*, *24*(6), 339–349.

Fleming, J. M., & Ownsworth, T. (2006). A review of awareness interventions in brain injury rehabilitation. *Neuropsychological rehabilitation*, *16*(4), 474–500. doi:10.1080/09602010500505518

Flynn, L., & Healy, O. (2012). A review of treatments for deficits in social skills and self-help skills in autism spectrum disorder. *Research in Autism Spectrum Disorders*, *6*(1), 431–441. doi:10.1016/j.rasd.2011.06.016

Fombonne, E., Quirke, S., & Hagen, A. (2011). Epidemiology of pervasive developmental disorders. In D.G. Amaral, G. Dawson, & D.H. Geschwind (Eds.), Autism spectrum disorders Oxford: Oxford University Press.

Freeman, D. (2007). Suspicious minds: the psychology of persecutory delusions. *Clinical psychology review*, *27*(4), 425–57. doi:10.1016/j.cpr.2006.10.004

Frith, U. (1989). *Autism: Explaining the Enigma.* Oxford, UK: Blackwell Publishing.

Frith, U., & Happé, F. (1999). Theory of mind and self-consciousness: What is it like to be autistic? *Mind & Language*, *14*(1), 82–89.

Garcia, A.M., Sapyta, J.J., Moore, P.S., Freeman, J.B., Franklin, M.E., March, J.S., & Foa, E.B. (2010). Predictors and moderators of treatment outcome in pediatric obsessive compulsive treatment study (POTS 1). *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(10), 1024-1033.

Gilmartin, A., & Slevin, E. (2010). Being a member of a self-advocacy group: experiences of intellectually disabled people. *British Journal of Learning Disabilities*, *38*(3), 152–159. doi:10.1111/j.1468-3156.2009.00564.x

Gilotty, L. Kenoworthy, L. Sirian, L. Black, D.O., & Wagner, A.E. (2002). Adaptive skills and executive function in autism spectrum disorders. *Child Neuropsychology, 8*(4), 241-248.

Goodley, D. (2000). *Self-advocacy in the Lives of People with Learning Difficulties.* Open University Press: Buckingham, UK.

Goodman, W. K., Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., et al. (1989). The Yale-Brown Obsessive Compulsive Scale I. Development, use, and reliability. *Archives of General Psychiatry, 46,* 1006–1011.

Green, J., Gilchrist, a, Burton, D., & Cox, A. (2000). Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorder. *Journal of Autism and Developmental Disorders*, *30*(4), 279–293.

Happé, F.G.E., & Booth, R.D.L., (2008). The power of the positive: Revisiting weak conherence in autism spectrum disorders. *The Quarterly Journal of Experimental Psychology,* 61, 50-63.

Happé, F., Briskman, J., & Frith, U. (2001). Exploring the cognitive phenotype of autism: Weak "central coherence" in parents and siblings of children with autism: I. Experimental tests. *Journal of Child Psychology and Psychiatry,* 42, 299-307.

Happé, F., & Frith, U. (2006). The weak coherence account: Detail-focused cognitive style in autism spectrum disorders. *Journal of Autism and Developmental Disorders,* 36, 5-25.

Harwood, D.G., Sultzer, D.L., & Wheatley, M.A. (2000). Impaired insight in Alzheimer disease: Association with cognitive deficits, psychiatric symptoms, and behavioral disturbances. *Neuropsychiatry, Neurospychology, and Behavioral Neurology, 13*(2), 83-88.

Hayes, S. a, & Watson, S. L. (2013). The impact of parenting stress: A meta-analysis of studies comparing the experience of parenting stress in parents of children with and without autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *43*(3), 629–42. doi:10.1007/s10803-012-1604-y

Heaton, R.K., Chelune, G.J., Talley, J.L., et al. (1993). *Wisconsin Card Sorting Test manual.* Odessa, Florida: Psychological Assessment Resources, Inc.

Hendrickson, W.L., & White, P.O., (1964). Promax: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology,* 17, 65-70.

Hill, E. L. (2004). Evaluating the theory of executive dysfunction in autism. *Developmental Review*, *24*(2), 189–233. doi:10.1016/j.dr.2004.01.001

Hill, E. L, & Bird, C. M. (2006). Executive processes in Asperger syndrome: patterns of performance in a multiple case series. *Neuropsychologia*, *44*(14), 2822–35. doi:10.1016/j.neuropsychologia.2006.06.007

Hill, E. L., & Frith, U. (2003). Understanding autism: Insights from mind and brain. In U. Frith & E. L. Hill (Eds.), Autism: Mind and brain (pp. 1–19). New York, NY: Oxford University Press.

Himle, J. A., Etten, M. L., Janeck, A. S., & Fischer, D. J. (2006). Insight as a Predictor of Treatment Outcome in Behavioral Group Treatment for Obsessive–Compulsive Disorder. *Cognitive Therapy and Research*, *30*(5), 661–666. doi:10.1007/s10608-006-9079-9

Hobson, R. P. (1990). On the origins of self and the case of autism. *Development and Psychopathology*, *2*(02), 163–181. doi:10.1017/S0954579400000687

Hughes, C. (2011). Changes and Challenges in 20 Years of Research Into the Development of Executive Functions. *Infant and Child Development*, *20*, 251–271. doi:10.1002/icd

Ingersoll, B., & Hambrick, D. Z. (2011). The relationship between the broader autism phenotype, child severity, and stress and depression in parents of children with autism spectrum disorders. *Research in Autism Spectrum Disorders*, *5*(1), 337–344. doi:10.1016/j.rasd.2010.04.017

Isaksen, J., Diseth, T.H., Schjolberg, S., & Shjeldal, O.H., (2013). Autism specutrum disorders – Are they really epidemic? *Eurpoean Jpurnal of Paediatric Neurollogy, 17,* 327-333.

Izzo, M. V., & Lamb, P. (2003). Developing self-determination through career development activities : Implications for vocational rehabilitation counselors. *Journal of Vocational Rehabilitation*, *19*, 71–78.

Jackson, P., Skirrow, P., & Hare, D. J. (2012). Asperger Through the Looking Glass: An Exploratory Study of Self-Understanding in People with Asperger's Syndrome. *Journal of Autism and Developmental Disorders*, *42*(5), 697–706. doi:10.1007/s10803-011-1296-8

Jahromi, L. B., Bryce, C. I., & Swanson, J. (2013). The importance of self-regulation for the school and peer engagement of children with high-functioning autism. *Research in Autism Spectrum Disorders*, *7*(2), 235–246. doi:10.1016/j.rasd.2012.08.012

Johnson, S. A., Filliter, J. H., & Murphy, R. R. (2009). Discrepancies between self- and parent-perceptions of autistic traits and empathy in high functioning children and adolescents on the autism spectrum. *Journal of autism and developmental disorders*, *39*(12), 1706–14. doi:10.1007/s10803-009-0809-1

Jurado, M. B., & Rosselli, M. (2007). The elusive nature of executive functions: a review of our current understanding. *Neuropsychology Review*, *17*(3), 213–233. doi:10.1007/s11065-007-9040-z

Kaiser, H.F. (1974). An index of factorial simplicity. *Psychometrika, 39,* 32-36.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2,* 217–250.

Kaufman, J., Birmaher, B., Brent, D., Rao, U., Flynn, C., Moreci, P., Williamson, D., & Ryan, N. (1997). Schedule for affective disorders and schizophrenia for school-aged children – present and lifetime (K-SADS-PL): Initial reliability and validity data. *Journal of American Academy of Child & Adolescent Psychiatry*, *36,* 980-988.

Kennedy, M. R. T., Coelho, C., Turkstra, L., Ylvisaker, M., Moore Sohlberg, M., Yorkston, K., Chiou, H.-H., et al. (2008). Intervention for executive functions after traumatic brain injury: a systematic review, meta-analysis and clinical recommendations. *Neuropsychological rehabilitation*, *18*(3), 257–99. doi:10.1080/09602010701748644

Kimchi, R. (1992). Primacy of wholistic processing and global/local paradigm: A critical review. *Psychological Bulletin, 112*(1), 24-38.

Knott, F., Dunlop, A.W., & Mackay, T. (2006). Living with ASD: how do children and their parents assess their difficulties with social interaction and understanding? *Autism*, *10*(6), 609–617. doi:10.1177/1362361306068510

Koldewyn, K., Jiang, Y. V, Weigelt, S., & Kanwisher, N. (2013). Global/Local Processing in Autism: Not a Disability, but a Disinclination. *Journal of autism and developmental disorders*. *3(10),* 2329-2340. doi:10.1007/s10803-013-1777-z

Koning, C., & Magill-Evans, J. (2001). Social and language skills in adolescent boys with Asperger syndrome. *Autism*, *5*(1), 23–36. doi:10.1177/1362361301005001003

Kovacs, M. (2011). The Children's Depression Inventory 2 (CDI 2) (2nd ed.). North Tonawanada, NY: Multi-Health System Inc.

Kratochwill, T. R., & Levin, J. R. (2010). Enhancing the scientific credibility of single-case intervention research: randomization to the rescue. *Psychological Methods*, *15*(2), 124–144. doi:10.1037/a0017736

Kumar, D. et al. (2010). Effect of meta-cognitive training in the reduction of positive symptoms in schizophrenia. *European Journal of Psychotherapy & Counselling*, *12*(2), 149–158.

Lerner, M.D., Calhoun, C.D., Mikami, A.Y., & De Los Reyes, A. (2012). Understanding parent-child social informant discrepancy in youth with high functioning autism spectrum disorders. *Journal of Autism and Developmental Disorders,* 42, 2680-2692.

Levy, A., & Perry, A. (2011). Outcomes in adolescents and adults with autism: A review of the literature. *Research in Autism Spectrum Disorders*, *5*(4), 1271–1282. doi:10.1016/j.rasd.2011.01.023

Lewin, A.B., Bergman, R., Peris, T.S., Change, S. McCracken, J.T., & Piacentini, J. (2010). Correlates of insight among youth with obsessive-compulsive disorder. *Journal of Child Psychology and Psychiatry, 51*(5), 603-611. doi: 10.1111/j.1469-7610.2009.02181.x

Lind, S. E. (2010). Memory and the self in autism : a review and theoretical framework. *Autism*, *14*(5), 430–456. doi:10.1177/1362361309358700

Lombardo, M. V, Barnes, J. L., Wheelwright, S. J., & Baron-Cohen, S. (2007). Self-referential cognition and empathy in autism. *PloS one*, *2*(9), e883. doi:10.1371/journal.pone.0000883

Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism diagnostic interview—revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. Journal of Autism and Developmental Disorders, 24, 659–685.

Losh, M., & Capps, L. (2003). Narrative Ability in High-Functioning Children with Autism or Asperger ' s Syndrome *. *Journal of Autism and Developmental Disorders*, *33*(3), 239–251.

Malian, I., & Nevin, a. (2002). A Review of Self-Determination Literature: Implications for Practitioners. *Remedial and Special Education*, *23*(2), 68–74. doi:10.1177/074193250202300202

Mandell, D.S., Lawer, L.J., Branch, K., Brodkin, E.S., Healy, K., Witalec, R., et al. (2012). Prevalence and correlares of uatism in state psychiatric hospitals, *Autism, 16,* 557-567.

Manthey, T. (2011). Using Motivational Interviewing to Increase Retention in Supported Education. *American Journal of Psychiatric Rehabilitation*, *14*(2), 120–136. doi:10.1080/15487768.2011.569667

Matson, J.L., & Kozlowski, A.M. (2011).The increasing prevalence of autism spectrum disorders. *Reserahc in Autism Spectrum Disorders, 5,* 418-435.

Matson, J. L., & Nebel-Schwalm, M. S. (2007). Comorbid psychopathology with autism spectrum disorder in children: an overview. *Research in Developmental Disabilities*, *28*(4), 341–352. doi:10.1016/j.ridd.2005.12.004

Matson, J. L., & Shoemaker, M. (2009). Intellectual disability and its relationship to autism spectrum disorders. *Research in developmental disabilities*, *30*(6), 1107–14. doi:10.1016/j.ridd.2009.06.003

Mazefsky, C. a, Williams, D. L., & Minshew, N. J. (2008). Variability in adaptive behavior in autism: evidence for the importance of family history. *Journal of Abnormal Child Psychology*, *36*(4), 591–9. doi:10.1007/s10802-007-9202-8

McKay, L. & Corkum, P. (2006). Evaluation of a demystification workshop for children with ADHD. *Journal of Developmental and Physical Disabilities, 18(3),* 319-332.

Mcnally, S. (2003). A Survey of Self-Advocacy Groups for People with Learning Disabilities in an English Region: Part II. *Journal of Intellectual Disabilities*, *7*(3), 231–249. doi:10.1177/14690047030073004

Medley, A. R., & Powell, T. (2010). Motivational Interviewing to promote self-awareness and engagement in rehabilitation following acquired brain injury: A conceptual review. *Neuropsychological Rehabilitation*, *20*(4), 481–508. doi:10.1080/09602010903529610

Messer, S. B., & Wampold, B. E. (2002). Let's Face Facts: Common Factors Are More Potent Than Specific Therapy Ingredients. *Clinical Psychology: Science and Practice*, *9*(1), 21–25. doi:10.1093/clipsy.9.1.21

Mikami, A.Y., Calhoun, C.D., & Abikoff, H.B. (2010). Positive illusory bias and response to behavioral treatment among children with attention deficit/hyperactivity disorder. *Journal of Clinical Child & Adolescent Psychology, 39*(3), 373-385. doi:10.1080/15374411003691735

Mitchell, P., & O'Keefe, K. (2008). Brief report: do individuals with autism spectrum disorder think they know their own minds? *Journal of Autism and Developmental Disorders*, *38*(8), 1591–1597. doi:10.1007/s10803-007-0530-x

Moritz, S., Jelinek, L., Hauschildt, M., & Naber, D. (2010). How to treat the untreated: effectiveness of a self-help metacognitive training program (myMCT) for obsessive-compulsive disorder. *Dialogues in Clinical Neuroscience,* 12, 209-220.

Moritz, S, Kerstan, a, Veckenstedt, R., Randjbar, S., Vitzthum, F., Schmidt, C., Heise, M., et al. (2011). Further evidence for the efficacy of a metacognitive group training in schizophrenia. *Behaviour research and therapy*, *49*(3), 151–7. doi:10.1016/j.brat.2010.11.010

Moritz S, Veckenstedt R, Randjbar S, Vitzthum F (2010). *Individualisiertes Metakognitives Therapieprogram fur Menschen mit schizophrener Psychose (MKT+) [IndividualizedMetacognitive Therapy for Patients with Psychosis (MCT+)].* Springer : Heidelberg.

Moritz, S, Veckenstedt, R., Randjbar, S., Vitzthum, F., & Woodward, T. S. (2011). Antipsychotic treatment beyond antipsychotics: metacognitive intervention for schizophrenia patients improves delusional symptoms. *Psychological Medicine*, *41*(9), 1823–1832. doi:10.1017/S0033291710002618

Moritz, S., Vitzthum, F., Randjbar, S., Veckenstedt, R., & Woodward, T. S. (2010). Detecting and defusing cognitive traps: metacognitive intervention in schizophrenia. *Current opinion in psychiatry*, *23*(6), 561–9. doi:10.1097/YCO.0b013e32833d16a8

Moritz, S., & Woodward T.S. (2007a). Metacognitive training in schizophrenia: From basic research to knowledge translation and intervention. *Current Opinion in Psychiatry,* 20, 619-525.

Moritz, S., & Woodward T.S. (2007b). Metacognitive training for schizophrenia patients (MCT): A pilot study on feasibility, treatment adherence, and subjective efficacy. *German Journal of Psychiatry*, 10, 69–78

Moritz S., Woodward T.S., Stevens, C., Hauschildt, M. & Metacognition Study Group (2010). *Metacognitive Training for Patients with Schizophrenia (MCT).* VanHam Campus Verlag: Hamburg.

Mottron, L. & Burack, J.A. (2001). Enhanced perceptual functioning in the development of autism. In: Burack JA, Charman T, Yirmiya N, Zelazo PR, editors. The development of autism: Perspectives from theory and research. Mahwah, NJ: Lawrence Erlbaum Associates. 131–148. 85.

Mottron, L., Dawson, M., Soulières, I., Hubert, B., & Burack, J. (2006). Enhanced perceptual functioing in autism: an update, and eight principles of autistic perception. *Journal of Autism and Developmental Disorders, 36*(1). 27-43

Naar-King, S. (2011). Motivational interviewing in adolescent treatment. *Canadian Journal of Psychiatry. 56*(11), 651–7.

O'Conner, B.P. (2000). SPSS and SAS prpgrams for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, & Computers, 32,* 396-402,

O'Hearn, K., Asato, M., Ordaz, S., & Luna, B. (2008). Neurodevelopment and executive function in autism. *Development and Psychopathology*, *20*(4), 1103–1132. doi:10.1017/S0954579408000527

Owens, J., Goldfine, M., Evangelista, N., Hoza, B., & Kaiser, N. (2007). A critical review of self-perceptions and the positive illusory bias in children with ADHD. Clinical Child and Family Psychology Review, 10, 335-351.

Ownsworth, T., & Clare, L. (2006). The association between awareness deficits and rehabilitation outcome following acquired brain injury. *Clinical psychology review*, *26*(6), 783–95. doi:10.1016/j.cpr.2006.05.003

Palmen, A., Didden, R., & Lang, R. (2012). A systematic review of behavioral intervention research on adaptive skill building in high-functioning young adults with autism spectrum disorder. *Research in Autism Spectrum Disorders*, *6*(2), 602–617. doi:10.1016/j.rasd.2011.10.001

Pellicano, E. (2010). Individual differences in executive function and central coherence predict developmental changes in theory of mind in autism. *Developmental psychology*, *46*(2), 530–44. doi:10.1037/a0018287

Pennington, B. F., & Ozonoff, S. (1996). Executive functions and developmental psychopathology. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 37(1), 51–87.

Perivoliotis, D., Grant, P. M., Peters, E. R., Ison, R., Kuipers, E., & Beck, A. T. (2010). Cognitive insight predicts favorable outcome in cognitive behavioral therapy for psychosis. *Psychosis: Psychological, Social and Integrative Approaches*, *2*(1), 23–33.

Perner, J. (2000) 'Memory and Theory of Mind', in E.Tulving & F.I.M. Craik (eds) The Oxford Handbook of Memory (pp. 297–312). Oxford: Oxford University Press.

Piers, E.V. & Herzberg, D.S. (2002). Manual for the Piers-Harris Children's Self-Concept Scale, 2nd Ed. Los Angeles, CA: Western Psychological Services.

Plaisted, K. (2001). Reduced generalization in autism: An alternative to weak central coherence. In J. A. Burack, T. Charman, N. Yirmiya, & P. R. Zelazo (Eds.), The development of autism: Perspectives from theory and research. Mahwah, NJ: Erlbaum.

Prett, M.A., Lackey, N.R., & Sullivan, J.J. (2003). *Making sense of factor analysis: The use of factor analysis for instrument development in health care research.* California: Sage Publications, Inc.

Rao, P.A., Beidel, D.C., & Murray, M.J. (2008). Social skills interventions for children with Asperger's syndrome or high-functioning autism: A review and recommendations, *Journal of Autism and Developmental Disorders,* 353–361. doi:10.1007/s10803-007-0402-4

Rees, C. S., & Van Koesveld, K. E. (2008). An open trial of group metacognitive therapy for obsessive-compulsive disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(4), 451–458. doi:10.1016/j.jbtep.2007.11.004

Reichow, B. (2012). Overview of meta-analyses on early intensive behavioral intervention for young children with autism spectrum disorders. *Journal of autism and developmental disorders*, *42*(4), 512–20. doi:10.1007/s10803-011-1218-9

Reynolds, C. R., & Kamphaus, R. W. (1992). Behaviour assessment system for children. Circle Pines, MN: American Guidance Service.

Rogers, S. J., & Vismara, L. a. (2008). Evidence-based comprehensive treatments for early autism. *Journal of clinical child and adolescent psychology*, *37*(1), 8–38. doi:10.1080/15374410701817808

Rose, J., Saunders, K., Hensel, E., & Kroese, B. S. (2005). Factors affecting the likelihood that people with intellectual disabilities will gain employment. *Journal of intellectual disabilities : JOID*, *9*(1), 9–23. doi:10.1177/1744629505049725

Rosenthal, M., Wallace, G. L., Lawson, R., Wills, M. C., Dixon, E., Yerys, B. E., & Kenworthy, L. (2013). Impairments in real-world executive function increase from childhood to adolescence in autism spectrum disorders. *Neuropsychology*, *27*(1), 13–8. doi:10.1037/a0031299

Ross, K., Freeman, D., Dunn, G., & Garety, P. (2011). A randomized experimental investigation of reasoning training for people with delusions. *Schizophrenia bulletin*, *37*(2), 324–33. doi:10.1093/schbul/sbn165

Russo, N., Flanagan, T., Iarocci, G., Berringer, D., Zelazo, P. D., & Burack, J. a. (2007). Deconstructing executive deficits among persons with autism: implications for cognitive neuroscience. *Brain and Cognition*, *65*(1), 77–86. doi:10.1016/j.bandc.2006.04.007

Schwartz, R. C. (1998). The relationship between insight, illness and treatment outcome in schizophrenia. *Psychiatric Quarterly*, *69*(1), 1–22.

Sebastian, C., Burnett, S., & Blakemore, S.J. (2008). Development of the self-concept during adolescence. *Trends in Cognitive Sciences*, *12*(11), 441–446. doi:10.1016/j.tics.2008.07.008

Semel, E.M., Wiig, E.H., & Secord, W.A. (2003). Clinical evaluation of language fundamentals (4th edn). San Antonio, TX: Psychological Corporation.

Sterling, L., Dawson, G., Estes, A., & Greenson, J. (2008). Characteristics associated with presence of depressive symptoms in adults with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *38*(6), 1011–8. doi:10.1007/s10803-007-0477-y

Streiner, D.L. & Norman, G (2003). *Health Measurement Scales: A Practical Guide to Their Development and Use.* Oxford University Press.

Storch, E.A., Merlo, L.J., Larson, M.J., Marien, W.E., Geffken, G.R., Jacob, M.L., Goodman, W.K., & Murphy, T.K. (2008). Clinical features associated with treatment-resistant pediatric obsessive-compulsive disorder. *Comprehensive Psychiatry, 48,* 35-42.

Sucksmith, E., Roth, I., & Hoekstra, R.A. (2011). Autistic traits below the clinical threshold: re-examining the broader autism phenotype in the 21st century. *Neuropsychology Review*, *21*(4), 360–89. doi:10.1007/s11065-011-9183-9

Tabachnick, B. G. & Fidell, L. S. (1989). *Using multivariate statistics*. New York: Harper & Row.

Tanaka, J.W., Wolf, J.M., Klaiman, C., Kopening, K., Cockburn, J., Herlihy, L., Borwn, C., Stahl, S., Kaiser, M.D., & Schultz, R.T. (2010). Using computerized games to teach face recognition skills to children with autism spectrum disorder: The Let's Face It! Program. *Journal of Child Psychology & Psychiatry, 52(8),* 944- 852.

Test, D.W., Fowler, C.H., Wood, W.M., Brewer, D.M., & Eddy, S. (2005). A conceptual framework of self-advocacy for students with disabilities *Remedial and Special Education,* 26(1), 43-54.

Toglia, J., & Kirk, U. (2000). Understanding awareness deficits following brain injury. *NeuroRehabilitation*, *15*(1), 57–70.

Toichi, M., Kamio, Y., Okada, T., Sakihama, M., Youngstrom, E. a, Findling, R. L., & Yamamoto, K. (2002). A lack of self-consciousness in autism. *The American Journal of Psychiatry*, *159*(8), 1422–1424.

Townson, L., Macauley, S., Harkness, E., Docherty, A., Dias, J., Eardley, M., & Chapman, R. (2007). Research project on advocacy and autism. *Disability & Society*, *22*(5), 523–536. doi:10.1080/09687590701427669

Van der Heiden, C., Muris, P., & Van der Molen, H. T. (2012). Randomized controlled trial on the effectiveness of metacognitive therapy and intolerance-of-uncertainty therapy for generalized anxiety disorder. *Behaviour research and therapy*, *50*(2), 100–9. doi:10.1016/j.brat.2011.12.005

Verhoeven, E. W. M., Marijnissen, N., Berger, H. J. C., Oudshoorn, J., Van der Sijde, a, & Teunisse, J. P. (2012). Brief report: relationship between self-awareness of real-world behavior and treatment outcome in autism spectrum disorders. *Journal of autism and developmental disorders*, *42*(5), 889–94. doi:10.1007/s10803-011-1311-0

Vickerstaff, S., Heriot, S., Wong, M., Lopes, A., & Dossetor, D. (2007). Intellectual ability, self-perceived social competence, and depressive symptomatology in children with high-functioning autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, *37*(5), 1647–1664. doi:10.1007/s10803-006-0292-x

Wechsler, D. (1999). Wechsler abbreviated scale of intelligence (4th ed.). San Antonio, TX: The Psychological Corporation.

Wechsler, D. (2004). The Wechsler intelligence scale for children—fourth edition. London: Pearson Assessment.

Weinberger, J. (1995). Common Factors Aren't So Common: The Common Factors Dilemma. *Clinical Psychology: Science and Practice*, *2*(1), 45–69.

Wells, A. (1995). Metacognition and worry: a cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy*, 23, 301-320.

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy*. Chichester, UK: Wiley.

Wells, A. (2007). Cognition About Cognition: Metacognitive Therapy and Change in Generalized Anxiety Disorder and Social Phobia. *Cognitive And Behavioral Practice*, *14*, 18–25.

Wells, A. (2009). Metacognitive therapy for anxiety and depression. New York/London: The Guilford Press.

Wells, A., & Colbear, J. S. (2012). Treating Posttraumatic Stress Disorder With Metacognitive Therapy: A Preliminary Controlled Trial. *Journal of Clinical Psychology*, *68*(4), 373–381. doi:10.1002/jclp.20871

Wells, A, Fisher, P., Myers, S., Wheatley, J., Patel, T., & Brewin, C. (2009). Metacognitive Therapy in Recurrent and Persistent Depression: A Multiple-Baseline Study of a New Treatment. *Cognitive Therapy and Research*, *33*(3), 291–300. doi:10.1007/s10608-007-9178-2

Wells, A., Fisher, P., Myers, S., Wheatley, J., Patel, T., & Brewin, C. (2012). Metacognitive therapy in treatment-resistant depression: a platform trial. *Behaviour Research and Therapy*, *50*(6), 367–373. doi:10.1016/j.brat.2012.02.004

Wells, A., & King, P. (2006). Metacognitive therapy for generalized anxiety disorder: an open trial. *Journal of Behavior Therapy and Experimental Psychiatry*, *37*(3), 206–212. doi:10.1016/j.jbtep.2005.07.002

Wells, A., & Matthews, G. (1994). *Attention and emotion: A clinical perspective*. Hove, UK: Erlbaum.

Wells, A., & Matthews, G. (1996). Modelling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy*, 34, 881–888.

Whitby, P. S., & Mancil, G. R. (2009). Academic Achievement Profiles of Children with High Functioning Autism and Asperger Syndrome : A Review of the Literature. *Education and Training in Developmental Disabilities*, *44*(4), 551–560.

White, S. J., Burgess, P. W., & Hill, E. L. (2009). Impairments on "open-ended" executive function tests in autism. *Autism research : official journal of the International Society for Autism Research*, *2*(3), 138–47. doi:10.1002/aur.78

White, S. W., & Roberson-Nay, R. (2009). Anxiety, social deficits, and loneliness in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *39*(7), 1006–1013. doi:10.1007/s10803-009-0713-8

Williams, D. (2010). Theory of own mind in autism : Evidence of a specific deficit in self-awareness? *Autism*, *14*, 474–494. doi:10.1177/1362361310366314

Williams, D. M., & Happé, F. (2009). What did I say? Versus what did I think? Attributing false beliefs to self amongst children with and without autism. *Journal of autism and developmental disorders*, *39*(6), 865–73. doi:10.1007/s10803-009-0695-6

Williams, D. & Happè, F. (2010a). Recognising 'social' and 'non-social' emotions in self and others: A study of autism. *Autism,* 14(4), 285-304.

Williams, D. & Happè, F. (2010b). Representing intentions in self and other: studies of autism and typical development. *Developmental science*, *13*(2), 307–19. doi:10.1111/j.1467-7687.2009.00885.x

Williams, D.M., Lind, S.E., & Happé, F. (2009). Metacognition may be more impaired than mindreading in autism. *Behavioral and Brain Sciences,* 32, 121-182. doi:10.1017/S0140525X09000818

Williamson, S., Craig, J., & Slinger, R. (2008). Exploring the relationship between measures of self-esteem and psychological adjustment among adolescents with Asperger syndrome. *Autism the international journal of research and practice*, *12*(4), 391–402. doi:10.1177/1362361308091652

Witkin H, Oltman P, Raskin E, Karp S. A Manual for the Embedded Figure Test. Mountain View, CA: Consulting Psychologists Press; 1971.

Wykes, T., Steel, C., Everitt, B., & Tarrier, N. (2008). Cognitive behavior therapy for schizophrenia: effect sizes, clinical models, and methodological rigor. *Schizophrenia bulletin*, *34*(3), 523–37. doi:10.1093/schbul/sbm114

Zwaigenbaum, L. (2011). Screening, risk, and early identification of autism spectrum disorders. In D.G. Amaral, G. Dawson, & D.H. Geschwind (Eds.), Autism spectrum disorders Oxford: Oxford University Press.

APPENDIX A

Appendix A.1: Training Protocol

Metacognitive Training for Adolescents with Autism Spectrum Disorder

Developed by:

Laura Goodman

Clinical Psychology PhD Student

Dalhousie University

Halifax, Nova Scotia

Supervisor:

Dr. Shannon A. Johnson

Associate Professor, Departments of Psychology, Psychiatry, & Pediatrics

Dalhousie University

Halifax, Nova Scotia

MCT Manual Contents

CHAPTER 1

Introductory Information for Facilitators

Differences in cognitive processing play a role in several psychological and neurodevelopmental disorders. While there is a great deal of evidence for cognitive differences in autism spectrum disorders (ASD), they are rarely the targets of intervention. There has been ample research conducted regarding specific processing biases in individuals with ASD; this is especially true for high functioning individuals with ASD. Three particularly well-established cognitive differences in ASD are: (1) attention to detail at the expense of seeing the 'big picture', (2) challenges with mental flexibility, and (3) poor executive functioning, in particular organization and planning. These differences can (and do) negatively impact the daily functioning of people with ASD.

It is likely that these cognitive challenges will persist throughout the lifespan and may interfere with education, job prospects, and relationships. Therefore, it is important that individuals with ASD be aware of their personal strengths and challenges so that they can better advocate for themselves and their unique needs. Unfortunately, it may be difficult for these individuals to recognize personal strengths and challenges, as recent research has begun to show a lack of self-awareness in individuals with ASD, particularly with regard to their own autistic symptoms.

Moreover, it can be hypothesized that these cognitive differences and self-awareness interfere with treatment for co-morbid mental health disorders as well as everyday life. For example, if an individual with ASD has limited metacognition processes this may interfere with treatments such as cognitive behavioural (Bares, 2011).

This is additionally problematic because according to recent evidence from research with schizophrenia, Alzheimer's disease, and obsessive-compulsive disorder, self-awareness of symptoms is related to better functioning (i.e., decreased levels of depression and/or agitation, reduced cognitive deficits, medication compliance, etc.) and positive treatment outcomes. As such, a specific training program that helps individuals with ASD learn about their cognitive differences and how these are related to both personal strengths and challenges may prove beneficial in regards to self-esteem, self-advocacy and future treatment efficacy.

To help individuals with ASD learn about their cognitive differences, we are adapting a therapy called Metacognitive Training (MCT). MCT, originally developed for anxiety disorders, focuses on modifying patients' 'thoughts about thoughts', 'worry about worry', and people's beliefs about symptoms such as rumination and worry and the power and consequences they attribute to these symptoms. MCT has been adapted for various anxiety disorders, in particular general anxiety disorder, obsessive-compulsive disorder, post traumatic stress disorder as well as depression. In addition, research has shown that MCT is efficacious in a brief group therapy format because it bypasses the need to target each patient's specific symptoms while potentially providing additional benefits such as the experience of universality, peer modeling, peer support, and normalizing the patient's experience. Furthermore, MCT has been adapted for patients with schizophrenia and there is preliminary support for its feasibility, safety, subjective efficacy, and beneficial effects. In MCT for schizophrenia, the group facilitators take information about cognitive biases obtained from basic research (e.g., jumping to conclusions, poor decision making, false memory, etc.) and transfer the knowledge to patients with the goal of increasing self-awareness and impacting their everyday lives.

In light of the concerns about the lack of intervention targeting cognitive differences in ASD as well as the previous success found in MCT with other patient populations, we have developed a version of MCT for high functioning adolescents with ASD. This manual provides facilitators with content and instructions for each of the 7 weekly sessions. It indicates which topics are to be covered in which session, allocates a recommended amount of time to each topic, and describes the rationale for and processes of carrying out the planned activities. However, it will be important for facilitators to tailor MCT to the unique concerns and experiences raised by members of each group. Making MCT relevant to the participants' lives will increase their engagement in the training program. With that said, it is important for facilitators to keep the goal of MCT (i.e., increase metacognition and building self-advocacy skills) in mind throughout the group and not be sidetracked by other challenges the participants may be experiencing (e.g., bullying, anxiety, etc.). Parents should be taught the information in an abbreviated for (i.e., one session) so that they can help their teens generalize skills outside of the group.

Throughout the 7 sessions, the information will be presented predominantly through fun activities. Each session is designed to last for approximately 90 minutes. Approximately 5-10 minutes is allotted at the beginning of each session to engage in a light-hearted icebreaker. While not directly related to metacogniton, these icebreakers are important as they foster social relationships amongst group members and allow the participants to share personal information about themselves that isn't related to their ASD and/or cognitive challenges; because they allow participants to talk about aspects of themselves not related to ASD, icebreakers continue throughout the intervention. The icebreaker is often followed by a short PowerPoint presentation to introduce the participants to the topic of the session (i.e., executive functioning, mental flexibility, big picture thinking) in a multimodal manner (verbal and visual). The goal of the presentation is to orient the participants to the key concepts and provide a common language for everyone to use.

Furthermore, during the presentation, the participants will be explicitly informed about how the cognitive differences impact many people with ASD. This is done intentionally so that participants can understand where these challenges come from rather than internalizing feelings of frustration, stupidity, inferiority, etc. The goals of each activity will be explicitly stated in the following chapters. This activities-based approach to teaching the concepts was chosen because understanding personal weaknesses can be a challenging experience and we wanted the participants to enjoy themselves as much as possible during the sessions. The remainder of the session will typically be spent in a discussion. During the discussions, it is important that each participant mentions how the topic being covered in the session applies directly to him/her. Each participant should leave the session with a new awareness of his/her personal strengths and challenges. For some of the topics, it may be easier for participants to recognize challenges; please make sure that this is balanced by an awareness of personal strengths and/or possible compensations strategies (e.g., keeping an agenda, asking for help, etc.). The Child Depression Inventory (CDI) or a similar symptom rating scale should be administered to the participants every 2 weeks to serve as a safeguard incase increased self-awareness causes increased levels of depression; follow-up with the participant and his/her parent(s) if (s)he starts endorsing more depressive symptoms.

On the final session of MCT, the participants will give a presentation to their invited guests (i.e., family and friends). The goal of the presentation is to help the participants consolidate the information they learned over the course of MCT as well as take a first step in self-advocacy (i.e., discussing personal strengths, challenges, and needs as individuals on the spectrum).

Chapter 2

SESSION 1: **Introduction to Facilitators & Psychoeducation**

Objectives:

1. Introduce the facilitators to the participants and introduce the participants to one another; the participants should learn all of the names of the group members and facilitators
2. Establish the general rules for MCT
3. Complete MCT questionnaires

Upon leaving, participants should:

1. Understand what metacognition is and how it is related to their daily functioning
2. Feel that they have an idea of how MCT will progress and the group goals

Materials

- Snack
- Flip chart and markers

Timeline for Session 2:

20 min	Introduction to Facilitators & Group Rules
20 min	Icebreaker: *Circle Name Game*
30 min	PowerPoint (*MCT*) & Discussion
20 min	Housekeeping & Homework

Overview:

The goals of this first session are to establish rapport and begin to facilitate the building of relationships between participants. Individuals in the group may be quite anxious during the first few sessions due to the novelty of the setting and its social aspects. Therefore, it is important to take time in the first session to introduce the facilitators and clearly outline how MCT is going to progress. It may be helpful to post a visual schedule of the upcoming activities at the beginning of each session. However, it is advised that you not include suggested times, because some activities may take longer or shorter than expected and we do not want the participants to become preoccupied with time.

The other main goal of the session is for participants to learn about the purpose, goals, and direction of the group. It is important that the facilitators work in a collaborative manner with the participants to set group rules. As well, it will be important to encourage and reward participation, although participants should not be pushed into speaking if they are not yet comfortable doing so. The collaborative approach, as well as encouraging and rewarding participation and appropriate social skills, should be consistent throughout each session.

Session Tasks:

Activity 1. Introduction of the Facilitators & Group Rules

The rules for the group should be developed collaboratively with the participants. The main points that should be covered are: confidentiality; listening to one another; respectful language; staying ‘on topic’; attendance; etc.

Activity 2. Icebreaker: Circle Name Game

The goal of the icebreaker is to make everyone more comfortable with speaking in front of the group and to learn a few interesting things about the other participants.

Everyone will sit in a circle that they form in the middle of the room. Each person must think of an adjective to describe him that begins with the same letter as his first name (for example, Sensible Sam). The first person only has to say their name and adjective, but the next person must say the people in order that have previously gone (for example, he is sensible Sam and I'm…"). This continues around the circle until the last person has to repeat all the names and adjectives.

Adjectives that match the first letter of the persons name is only one theme that the group could choose. Play more than one round, depending on the amount of time available, and alternate who starts and ends. Other options could include, but are not limited to:

- Their name and their favorite animal
- Their name and their favorite food
- Their name and somewhere they love to go in the HRM

Activity 4. PowerPoint Presentation (MCT) & Discussion

Please see the corresponding PowerPoint slides. The purpose of this presentation is to explain what metacognition is and how it plays a role in daily life, how MCT will progress, and what the goals of the group are. Participants should be encouraged and rewarded for asking questions and contributing to the discussion.

Activity 5. Housekeeping and Homework

1) **Prepare for Session 2:** For next week's activity, participants will have to work together to build a protective structure for an egg so that it remains unbroken when dropped. For homework, the participants are required to make a plan for their structure.

SESSION 2: **Executive Functioning**

Objectives:

1. Continue to foster relationships between participants
2. The main goal of the activities is to give participants the chance to practice planning, organizing, problem-solving, and cooperation

Upon leaving, participants should:

1. Feel that they have an idea of what executive functioning (EF) is and how it impacts their daily lives
2. Begin to identify their own EF strengths and weaknesses

Materials:

- Snack
- Flip chart & markers
- Computer & projector
- Mini boxes of Smarties (one for each group member)
- Materials Needed (for each group): Raw egg; 1 pair of scissors; $50 in Monopoly money; 1 pencil; Tissue paper; Felt; Plastic drinking straws; Coffee stirrers; String; Paper clips; Rubber bands; Pompoms; Pieces of paper towel; Paper bowls; Paper plates; Styrofoam cups; Balloons; Bubble wrap

Timeline for Session 2:

10 min	Icebreaker: *Smarties*
5 min	Check-in
20 min	PowerPoint: *Executive Functioning*

50 min	Egg Drop & Discussion
5 min	Housekeeping & Homework

Overview:

The focus of this session is executive functioning (EF). Executive functioning is defined as collection of brain processes (i.e., a cognitive system) that are responsible for planning and organizing, cognitive flexibility, abstract thinking, rule acquisition, initiating appropriate actions and inhibiting inappropriate actions, etc. Research suggests that individuals on the autism spectrum have particular difficulty with specific areas of EF. For the purpose of this session, you will be focusing on planning, organization and problem-solving, three key components of EF that impact the daily lives of people with ASD.

The main activity for this session is the egg drop (see below for details). The goal of the egg drop activity is for participants to work together to build a protective structure for the egg so that it remains unbroken when dropped. The participants will have begun the planning process for homework. The facilitators will have to help each group decide upon one plan and then carry out that plan (i.e., purchasing the right amount of material, building the structure, etc.). This activity is expected to be challenging yet fun. Review the group rules before starting the activity as it is expected that participants will have differences of opinions on how the structure should be built. The facilitators will have to be closely involved with each group to encourage respectful problem solving.

Session Tasks:

Activity 1. Icebreaker: Smarties

Pass around mini boxes of Smarties. Have each group member choose two Smarties from the box. After everyone has chosen 2 Smarties, each person must answer the two questions that correspond to his or her chosen colour. The questions associated with each colour are in the PowerPoint presentation. After they have answered all of the questions, allow group members to finish their boxes of candy.

Activity 2. Check In

This time is reserved for the facilitators to ask the participants about the homework and if the participants were able to come up with a plan for the egg drop. Bring up the idea of planning (its importance and how challenging it can be). This should lead directly into Activity 3.

Activity 3. PowerPoint: Executive Functioning

Please see the corresponding PowerPoint slides.

Activity 4. Egg Drop

Divide participants into 2 teams. The goal is to build a protective structure for the egg so that it remains unbroken when dropped from a predetermined height onto a hard surface. Provide each group with a raw egg, a pair of scissors, a "Materials Order Form", $50 in Monopoly money, and a pencil. Explain to the groups that they are to build a structure to protect to their egg. They are allowed to order anything on their materials lists, providing that it does not exceed their $50 budget – they have to work together and choose one plan (i.e., they can either choose one person's plan from the homework or combine the plans). They must fill out the order form, specifying their requested number of materials. Tell each group that they have 15 minutes to decide on a plan and complete the form. Upon completing the form, provide the groups with their requested materials and remind them that they now have 30 minutes to build a structure to protect their egg. After 30 minutes, the groups will ceremoniously drop their eggs.

Activity 5. Discussion: Egg drop

- What aspects did the participants like? What aspects did they not like?
- Was their protective structure successful and if not, how would the change their plan if they were asked to redo the activity?
- Was there anything about the activity that was particularly challenging; in particular, what EF skills did the egg drop require that made it difficult*?*
- Was there anything about the activity that was not challenging; in particular, what EF skills did you do well? *Note these on the flip chart.*
- When do you have to use similar EF skills in real-life and is this an area that is hard for you/not hard for you? *Personalize EF difficulties and strengths for each participant.*
- What strategies could you use when you are having difficulty planning and organizing?

Activity 6. Housekeeping and Homework

1) **Preparation for Session 3:** Object Creativity Game: For homework participants have to pick one object and use it in 3 unique ways. Let the participants know that the game will require them to be creative and a little silly when thinking up multiple ways to use everyday objects. After they have used an object in a new funny way, they should take a picture to show the group.
2) **Complete the anonymous satisfaction questionnaire before group ends**

Materials Order Form

Budget: $50

Paper plate	#______ @ $10.00 each
Paper bowl	#______ @ $10.00 each
Plastic drinking straw	#______ @ $1.00 each
1 piece of felt	#______ @ $3.00 each
Sheet of tissue paper	#______ @ $2.00 each
Ball of String	#______ @ $5.00 each
Roll of masking tape	#______ @ $10.00 each
Paper Clip	#______ @ $0.50 each
Elastic band	#______ @ $1.00 each
Piece of paper towel	#______ @ $1.00 each
Pompom	#______ @ $0.50 each
Styrofoam Cups	#______ @ $5.00 each
Balloon	#______ @ $5.00 each

SESSION 3: **Mental Flexibility**

Objectives:

1. Continue to foster relationships between participants
2. The activities should help the participants recognize the importance of flexible thinking and perspective taking.

Upon leaving, participants should:

3. Know what mental flexibility is and how it relates to their lives
4. Be able to identify personal strengths and weaknesses in mental flexibility

Materials:

- Snack
- Flip chart for discussion
- Computer & projector
- One ball of pre-measured yarn

Timeline for Session 2:

5	Icebreaker: "*Toss the String, Please!*"
10	Check-in
30	PowerPoint: *Mental Flexibility*
40	Role Play & Discussion
5	Housekeeping & Homework

Overview:

The focus of this session is mental flexibility. Mental flexibility is defined as the ability to shift the focus of attention and move between tasks having different cognitive requirements. It is part of executive functioning and is an area in which individuals with ASD are known to have significant impairment. People with ASD are often described as becoming ‘stuck’ on a particular topic of conversation, activity, way of approaching a situation, etc. This has widespread consequences in their daily lives.

The goal of this session is to help participants understand the importance of being mentally flexible (i.e., being able to shift attention, see another person’s perspective, etc.). While we will be practicing mental flexibility in the session, the goal is not make participants more ‘flexible’. Rather, we want participants to become aware that sometimes they get ‘stuck’ in their thinking and may need to work harder than other people to see things from a different perspective or ask someone for help to think about something in a different way.

Session Tasks:

Activity 1. Icebreaker: “Toss the String, Please!”

This icebreaker will help the participants get to know each other even better. They will sit in a circle on the floor, about an arms length apart. The facilitator will choose the participant who will start the game by handing them a ball of yarn. This participant will be instructed to find the end of the ball of string and hold onto it. They will then toss the ball to someone else in the circle. The person who catches the ball of yarn will be asked a personal question by the person who tossed it. Once that person has answered the question they hold on to part of the yarn closest to them and toss the remainder to a new person and ask a new question. The game will continue so everyone has had at least one turn and the string is all gone. Depending on the needs of the group, the facilitators may choose to write a list of questions on the flip chart before the game.

Activity 2. Check-In

This time is reserved for the participants and the facilitators to review the homework from the last session. Ask the participants what was tricky and/or interesting about the Object Creativity game; this should lead directly into Activity 3.

Activity 3. PowerPoint Presentation: Mental Flexibility

Please see the corresponding PowerPoint slides.

Activity 4. Role Play & Discussion

Have the participants split into groups of 2 and assign one partner the role of the father and the other the role of the son. All groups will complete the same role-play at the same time. The instructor will read the situation to the entire group and they will have 2 minutes to do the role-play before switching roles and re-doing the scenario. Repeat for the three role-plays listed below.

- *Father vs. Son Situations:* The father wants the son to clean his room before he can watch his favorite TV show and the son doesn't want to.
- *Teacher vs. Student Situations:* The student wants an extension on their assignment from the teacher, but the teacher is hesitant to give the extension.
- *Friend vs. Friend Situation:* The friends are going to the movies, but each wants to see a different film.

After the role-plays, have the group discuss the activity. Discussion points:

- What aspects did they like? What aspects did they dislike?
- Was it hard to take the perspective of both people in the role-play? Why is it important to be able to take another person's perspective?
- How is perspective taking related to mental flexibility?

- What strategies could you use when you are in a disagreement with someone and having difficulty seeing their perspective?

Activity 5. Housekeeping and Homework

1) **Review of Session 3:** Write about one example from your life of when you had difficulty displaying mental flexibility (i.e., you got ‘stuck’ thinking about something in one way) and one example where you showed flexible thinking.
2) **Complete the anonymous satisfaction questionnaire before group ends**

Chapter 5

SESSION 4: **Big Picture Thinking**

Objectives:

1. Further develop the group relationships
2. The main goal of the activity is to practice looking for themes and seeing the 'bigger picture'

Upon leaving, participants should:

1. Know what big picture thinking is and how it is present in their lives
2. Be able to identify their strengths and weaknesses related to seeing the big picture

Materials:

- Snack
- Flip chart & makers
- Computer & projector
- Bingo sheets for the Icebreaker

Timeline for Session 2:

10	Icebreaker: *Bingo*
10	Check-in
20	PowerPoint: *Big Picture Thinking*
30	Zooma & Discussion
20	Housekeeping & Homework

Overview:

The focus of this session is on big picture thinking. Many individuals with ASD demonstrate an inability to integrate pieces of information into coherent wholes (i.e., big picture) and rather are overly focused on local detail, at the expense of global meaning. At times, this attention to detail can be an important strength, but at other times, it can lead to difficulty and impair daily functioning.

The goals of this session are to help participants understand that it is important to be able to see detail as well as the 'bigger picture'. While we will be practicing global processing in the session, the goal is not make participants less detail oriented. Rather, we want participants to become aware that sometimes they will be overly focused on detail and may need reminders and assistance seeing the bigger picture and understanding themes.

Session Tasks:

Activity 1. Icebreaker: Bingo

Create a series of bingo cards, but instead of using the traditional numbers, include a sentence describing a person in each box. For example, "I have a pet cat," "I have a big brother" or "I like green olives". Have each teen walk around the room, asking other kids to sign any boxes that are applicable. Not only is this game entertaining, it is an effective way for children to learn more about each other. If you wish to make the activity competitive, award a prize to the first participant to gets five signed squares in a row.

Activity 2. Check-In

This time is reserved for the participants and the facilitators to review the homework from the last session and check-in about how the week went.

Activity 3. PowerPoint Presentation: Big Picture Thinking

Please see the corresponding PowerPoint slides.

Activity 4. Word and Picture Zooma

The goal of this activity is to get the participants to recognize themes between sets of pictures and sets of words. Some of the pictures will be close ups of a certain object and the participants will have to guess what the bigger picture is. Other pictures will show three related photos and the participants will have to guess the common theme. All of the pictures and words are on the PowerPoint slides.

Depending on the competitive nature of the group, you could turn this into a game. Participants could work individually or in small groups and earn small treats for each answer they get right. For some groups, this may make the activity more fun and fast-paced. However, if there are members of the group who have difficulty participating or become very emotional when losing a game, adding a competitive aspect to the activity may not be appropriate. Alternatively, you could have everyone remain silent when a new image/word appears and rather, they have to write down what they think it is and then share with the group. One facilitator can take part in the activity and make mistakes to show the participants an appropriate response to making mistakes and/or losing.

Activity 5. Discussion

After zooma, have the group discuss the activity. Discussion Points:

- What aspects did they like? What aspects did they dislike?
- Was it hard to try to find themes in the pictures?
- Why is it important to be able to see the ‘bigger picture’?
- What strategies could you use when are stuck on noticing detail?
- What are the strengths in being able to focus on detail? What does being detail-oriented make you better at than other people?

- What strategies can you use when you are feeling stuck on detail?

***Activity 6. Housekeeping and* Homework**

1) **Preparation for Session 5:** Think about what activities/topics you would like to discuss in the presentation.
2) **Complete the anonymous satisfaction questionnaire before group ends**

Chapter 6

SESSION 5: **MCT Review**

Objectives:

1. Review the key points about mental flexibility, executive functioning and big picture thinking and bring together overarching themes

Upon leaving, participants should:

2. Know their role in the presentation
3. Be ready to begin preparing for the presentation

Materials:

- Snack
- Flip chart & marker
- Computer & projector
- Masking tape for the icebreaker

Timeline for Session 2:

10	Icebreaker: "*Would You Rather?*"
10	Check-in
30	PowerPoint (*Review*) & Discussion
30	Group Presentation Discussion and Role Assignment
10	Housekeeping & Homework

Overview:

The goal of this session is to tie the three topics (i.e., executive functioning, mental flexibility, and big picture thinking) together and show participants how closely related they really are. The overall message you should be trying to convey is that executive functions like planning, organizing, and problem solving are necessary to help get through the day and be successful at achieving goals. In order to be a good problem solver, you need to be mentally flexible and to think of more than one way to solve a problem. This means that you cannot be overly focused on detail and that you need to have to be able to switch between seeing the details and looking for the bigger picture. As well, part of the discussion should how, when, and with whom to advocate for oneself.

Session Tasks:

Activity 1. Icebreaker: "Would You Rather?"

This "Would You Rather" icebreaker game can be either serious or silly, depending on what participants and facilitators want. To begin with place a line of tape down the centre of the room. Ask the participants to straddle the tape and start asking them "Would you rather…" questions. For each question, assign the choices to the sides of the tapeline. When asked 'Would you rather…?' they have to jump to the left or right as indicated by the leader. Here are some examples of the "Would you rather…" questions.

- Visit the doctor or the dentist?
- Eat broccoli or carrots?
- Watch TV or listen to music?
- Own a lizard or a snake?
- Have a beach holiday or a mountain holiday?
- Be invisible or be able to read minds?
- Be hairy all over or completely bald?
- Go without television or fast food for the rest of your life?
- Always be cold or always be hot?

Activity 2. Check-In

This time is reserved for the participants and the facilitators to review the homework from the last session and check-in about how the week went.

Activity 3. PowerPoint Presentation: Review

Facilitators will present an overview of the most important information from the past three sessions. Remind the participants of the activities they participated in and what they learned from the activities. This will help the students think of their experiences and how they would be able to present this to an audience for their group presentation.

Part of the discussion should also pertain to how the participants are going to use their new metacognition in their daily lives. Discussion points:

- Why do they think it’s important to talk to about personal strengths and challenges?
- In what areas will they have to advocate for themselves (i.e., school, work, relationships, etc.)?
- What makes talking about personal strengths and challenges?

Activity 4. Group Presentation Discussion and Role Assignment

All of the participants in the MCT will be expected to take on a role in the group presentation; however, they will be able to choose their own level and type of involvement. This time will be designated for the group to decide on the structure of their presentation and what topics from MCT they will choose to present on. Roles for the presentation could include, but are not limited to: creating a handout for the audience, putting the PowerPoint together, writing a script for their speaking section, etc.

Facilitators should be supportive, ensuring that each student has assumed a role in the presentation.

The presentation is not meant to be formal or overly educational for the audience. Rather, it is an opportunity for the participants to share what they have learned with their family and friends. The presentation should include general pieces of knowledge they learned; things they learned about themselves; and important things to share with a new teacher or future employer about their strengths and areas of need.

Activity 5. Housekeeping and Homework

1) **Prepare for Session 6:** Work on presentation.

Chapter 7

SESSION 6: **Dress Rehearsal for Presentation**

Objectives:

1. Practice the presentation
2. Learn how to give and receive feedback

Materials:

- Snack
- Flip chart for discussion
- Computer

Timeline for Session 2:

5	Icebreaker: *Jedi Numbers*
5	Check-in
35	Finish Presentation
30	Dress Rehearsal
10	Learning How to Give Feedback
5	Housekeeping & Homework

Overview:

The session will focus on finishing the work that needs to be done for the presentation and doing a 'dress rehearsal' of the presentation. This is an opportunity for participants to practice their parts of the presentation as well as learn how to give and receive feedback.

Session Tasks:

Activity 1. Icebreaker: Jedi Numbers

Ask the group to stand in a circle. Set a numeric goal for the group to reach (start with 15 or so). Explain to the group that once the activity begins, participants can only say a number - no side conversations or strategies!

Once the leader says, "Go," someone (whoever decides to start) in the group starts by saying, "One," followed by someone different (whoever decides to speak next) calling out, "two," and so one until the group reaches its goal. The challenge is that if more than one person calls out a number at the same time, the group must start over at the beginning. Since there is not a set order, this Happéns quite a lot!

Activity 2. Check-In

This time is reserved for the participants and the facilitators to review the homework from the last session and check-in about how the week went.

Activity 3. Work on Presentation

Take this time to finish up anything that needs to be done for the presentation. This could include handouts, scripts, PowerPoint slides, etc.

Activity 4. Dress Rehearsal

Activity 5. Learning How to Give Feedback

Participants should be encouraged to give each other feedback. This can be tricky, as it may lead to interpersonal conflict. Learning to give feedback is an important skill. Use the 'Oreo cookie' model to teach how to give feedback (i.e., positive feedback, constructive comment, and another piece of positive feedback). Examples of how to deliver feedback in this manner are on a double-sided handout attached below.

Activity 6. Housekeeping and Homework

1) **Prepare for Session 7:** Practice presentation.

Giving Feedback

WHY?

Giving people feedback on their work helps them recognize what they did well and what they can improve on in the future.

HOW?

When giving feedback, think of an OREO.

POSITIVE (top of cookie)	POSITIVE: what did the person do well? What did you like?
CONSTRUCTIVE (middle of cookie)	CONSTRUCTIVE: what could they do better next time?
POSITIVE (bottom of cookie)	POSITIVE: what did the person do well? What did you like?

Ex: “I enjoyed how you used a joke in your presentations. *It is important to remember to make eye contact with the audience*. I was impressed with how clearly and loudly you spoke.”

POSTIVE PHRASES:

I liked/ enjoyed how…

You made good use of…

You remembered to…

I was impressed by…

You have an effective way of…

I could tell that…

CONSTRUCTIVE PHRASES:

It helps to…

We all have to work at…

It is recommended that…

Don’t forget to…

Let’s all keep in mind…

With more practice…

EXAMPLES of POSITIVE and CONSTRUCTIVE TOPICS:

Pacing of speech

Effective pausing & timing

Volume

Tone & articulation

Room Scanning/ Eye Contact

Polite, respectful

Posture

Facial Expression

Use of gestures

Interesting, informative, etc.

Use of humour

Audience involvement

Confidence

Enthusiasm

Chapter 8

SESSION 7: **Presentation & Graduation**

Objectives:

1. Give the presentation for family and friends
2. Celebrate with family and friends over snacks

Materials:

- Snack
- Flip chart for discussion
- Snack and utensils for celebration
- Personalized certificates of graduation

Timeline for Session 2:

10	Icebreaker: Two Truths and a Lie
5	Check-in
60	Presentation for Family & Friends
10	Celebration
5	Housekeeping & Homework

Overview:

The primary goal of this session is celebration and self-advocacy. The participants should be at a point where they are aware of their personal strengths and challenges and can explain these to friends and family. The aesthetics and delivery of the presentation is much less important than the opportunity for the participants to practice advocating for themselves. It is also important to take the time to celebrate. We want the participants to acknowledged what they have achieved and feel proud of the work they have done. If time permits, it would nice to say something specific about each participant so that (s)he can feel recognized as an individual who is not just defined by his/her ASD and difficulties.

Session Tasks:

Activity 1. Icebreaker: Two Truths and a Lie

Ask each person in the group to think of two true facts about themselves, and one lie. Each person in the group takes a turn telling the group their three items.The group then has to agree on which fact they think is a lie. Once the group announces their decision, the participant tells the group the correct answer. The group then can talk about any of the interesting things they just learned about the new person.

Activity 2. "Check In"

This time is reserved for the participants and the facilitators to review the homework from the last session and check-in about how the week went.

Activity 3. Presentation for Family & Friends

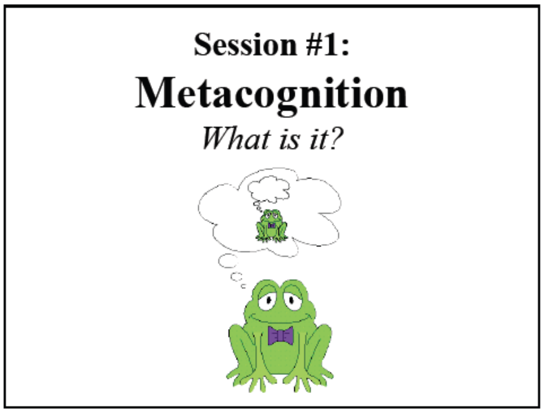
Activity 4. Celebration and Certificates

Take this time at the end of MCT to celebrate the hard work that participants have done. Cake and drink can be provided. The facilitators will present the participants with their certificates of MCT completion.

Activity 6. Housekeeping

1) Remind participants that while the group is over, the research component is not. Everyone should be scheduled for a follow-up appointment, and be reminded of the schedule for completing the program evaluation questionnaires.

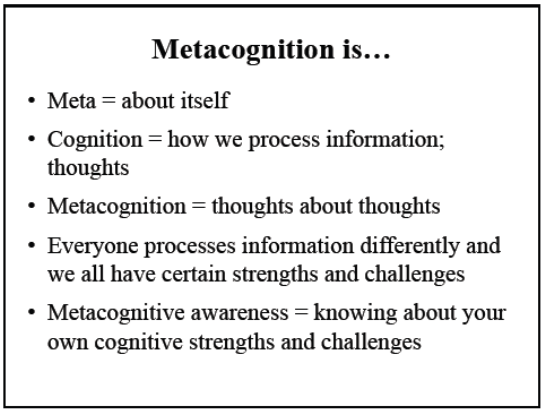
Appendix A.2: MCT Sample Slides



Session #1:

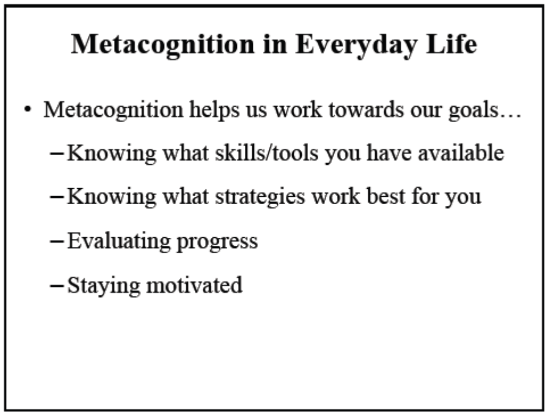
Metacognition

What is it?



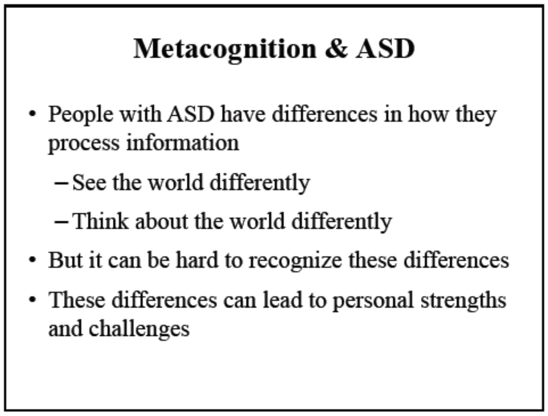
Metacognition is…

- Meta = about itself
- Cognition = how we process information; thoughts
- Metacognition = thoughts about thoughts
- Everyone processes information differently and we all have certain strengths and challenges
- Metacognitive awareness = knowing about your own cognitive strengths and challenges



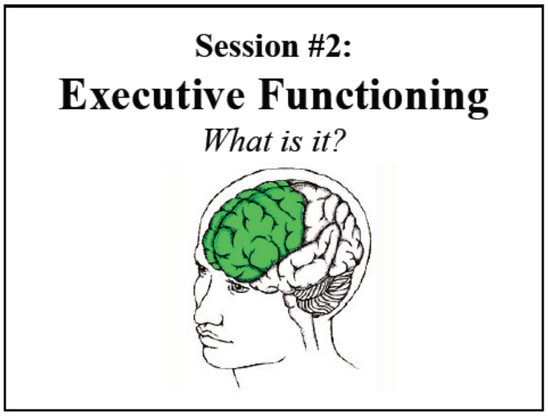
Metacognition in Everyday Life

- Metacognition helps us work towards our goals…
  - Knowing what skills/tools you have available
  - Knowing what strategies work best for you
  - Evaluating progress
  - Staying motivated



Metacognition & ASD

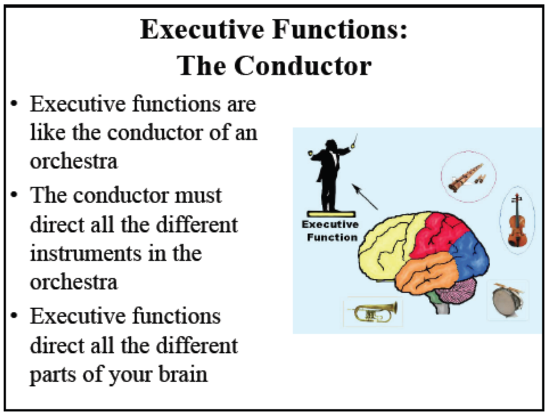
- People with ASD have differences in how they process information
  - See the world differently
  - Think about the world differently
- But it can be hard to recognize these differences
- These differences can lead to personal strengths and challenges



Session #2:

Executive Functioning

What is it?



Executive Functions: The Conductor

- Executive functions are like the conductor of an orchestra
- The conductor must direct all the different instruments in the orchestra
- Executive functions direct all the different parts of your brain

Executive Functions

- Executive functions help you work towards achieving a goal
- They help you carry out your day-to-day activities
- Include:
  - Planning
  - Organizing
  - Decision making
  - Problem solving
  - Controlling your emotions
  - Thinking before you act

Executive Functioning & ASD

- Research shows that lots of people with ASD have difficulty with executive functioning
- This makes some activities difficult, for example:
  - Getting homework done on time
  - Making plans with your friends
  - Managing time, money, etc.
  - Knowing when to ask for help
  - Waiting to speak until it's your turn
  - Getting frustrated or angry quickly
- *Are any of these things hard for you?*

Activity: Egg Drop

We all have strengths and challenges with some areas of executive functioning.

Let's explore an activity where we can put our executive functions to use and HAVE FUN!

Discussion

- What did or didn't you like about the egg drop?
- Was your structure successful and if not, how would you change your plan if you could do it again?
- Was there anything about the activity that was really hard?
- What executive functioning skills did you use?
- When do you have to use similar skills in real-life?
- What strategies could you use when you are having difficulty planning, organizing, and problem solving?

Session #3:

Mental Flexibility

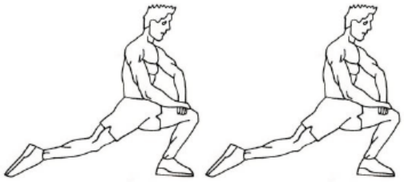
What is it?

Mental Flexibility is…

- Being able to look at or think about a situation from different perspectives
  - Lets you change your thoughts and actions depending on changes in the environment
  - Lets you think of different ways to solve a problem so that you can find the best answer
  - Helps your see others' points of view
  - Helps you switch easily from one task to another
  - Helps you cope with changes in routine

Mental Flexibility and ASD

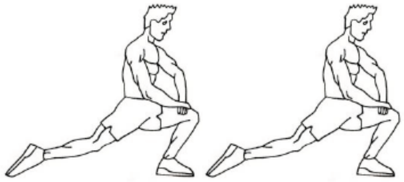
- Research shows that lots of people with ASD have difficulty with mental flexibility
- Some people with ASD have difficulty with:
  - Coping with changes in routine
  - Thinking of different ways to solve a problem
  - Taking someone else's perspective and seeing his/her point of view
- Sometimes, people with ASD feel stuck
- *Does this happen to any of you?*



Just like you stretch your body to be physically flexible, you should 'stretch your mind' to be mentally flexible!

LET'S PRACTICE!

What do you see?



Now let's 'stretch your mind' with homographs!!!!

Homographs are words that are spelt the same way but have different meanings

Find the Homograph?

- **What word connects these two words…**

PILLOW → ? ← COURT

Find the Homograph?

- **What word connects these two words…**

PILLOW → **CASE** ← COURT

How To Be More Flexible

- When you feel stuck, ask yourself:
  - Why do I think this way?
  - Can I think about this another way?
- When you don't understand someone else's perspective, ask yourself:
  - Why do they think that way?
  - How are they feeling right now?
- Ask others for help
  - How does this make you feel?
  - Can you help me see this problem in a different way?

Mental Flexibility
is important to EVERYONE!

Let's challenge our mental
flexibility and
BE CREATIVE.

Role Playing

- Try to view a situation through the eyes of another person
  - Flexible thinking involves trying to understand why other people think they way they do
  - Flexible thinking helps build friendships
  - Flexible thinking helps you learn from others

Role Playing

- Each person will then be handed a piece of paper with a different role
- Take a moment to think about how the person you are role playing would respond to the situation
  - How would you feel?
  - And how would you explain your point to the other person?
- Now switch!
  - What's different about this role?

Discussion

- What was fun about role playing? What didn't you like about it?
- Was it hard to take the perspective of both people in the role play?
- Why is it important to be able to take another person's perspective?
- How is perspective taking related to mental flexibility?
- What strategies could you use when you are in a disagreement with someone and having difficulty seeing their perspective?

Session #4

Big Picture Thinking

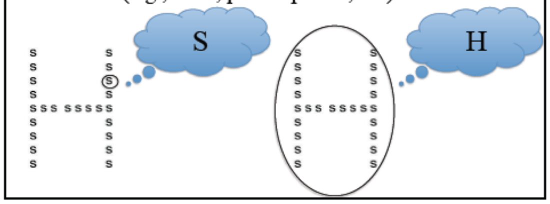
What is it?

What is Big Picture Thinking?

- Seeing the 'big picture' (the whole) instead of focusing on the details
- It's like seeing the whole image of a puzzle instead of focusing on only one or two pieces!

Big Picture Thinking & ASD

- Research shows that lots of people with ASD have difficulty seeing the big picture (e.g., forest, puzzle picture, 'H')
- This is because they are often focused on the little details (e.g., trees, puzzle pieces, 'S')



Big Picture Thinking & ASD

- In particular, some people with ASD have difficulty with:
  - Understanding themes or messages in stories
  - Learning abstract ideas
  - Understanding metaphores
- What are the disadvantages of missing the big picture?
- What are some of the advantages of being focused on details?
- *Does getting stuck on small details ever happen to any of you?*

How can we try to see the whole picture?

- Stop
- Recognize that you might only be focusing on the details
- Step back from the situation and try to put all the details together to form ONE, big picture
- Ask someone for help

YouTube Example:
Advantages of seeing DETAILS

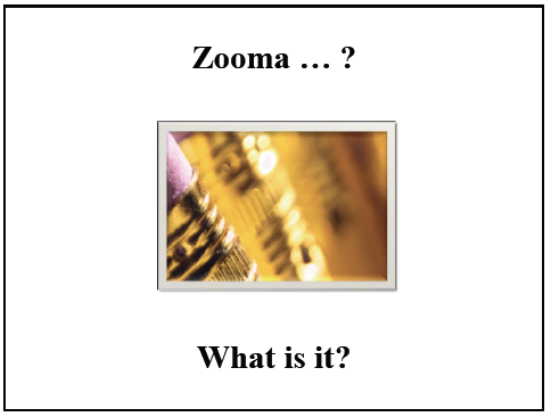
- http://www.youtube.com/watch?v=uAyhz2m-UuQ

Zooma!

- You're going to see a series of pictures that have been *zoomed* in
- They are so zoomed in that it's hard to know what you are looking at
- You're job is to try figure out what the bigger picture is!
- Good luck!

Part I.
Practice

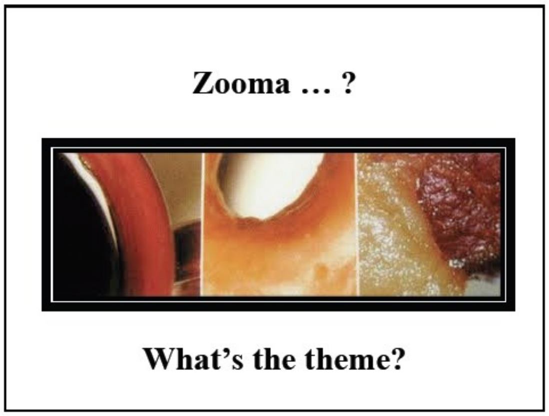
- You will be presented with a picture that has been zoomed in
- When you see the picture, NO TALKING!
- You will need to first identify and then record what the whole object would be
- As a group we will discuss each Zooma!



Zooma … ?

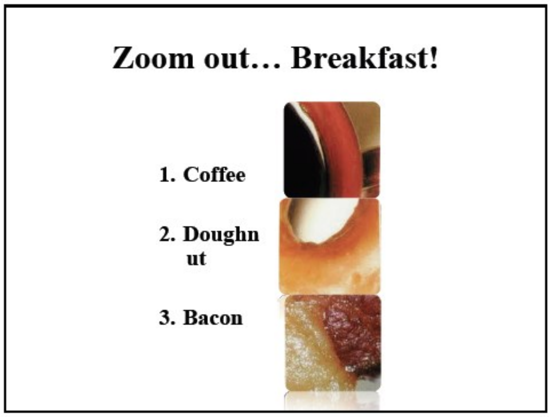
What is it?

Zoom Out… Pencils!



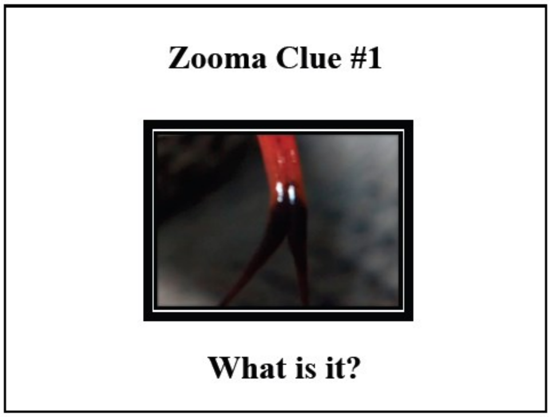
Zooma … ?

What's the theme?



Zoom out… Breakfast!

1. **Coffee**
2. **Doughn ut**
3. **Bacon**



Zooma Clue #1

What is it?

Zooma Clue #2

Zooma Clue #3

A SNAKE!

Discussion

- What did you like about Zooma and what didn't you like?
- Was it hard to try to find themes in the pictures?
- Why is it important to be able to see the 'bigger picture'?
- What strategies could you use when you are stuck focusing on detail?
- What are the strengths in being able to focus on detail? What does being detail-oriented make you better at than other people?