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The Frequency and Competency of Executive Functions Assessment and Intervention Among Practicing School Psychologists

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THE FREQUENCY AND COMPETENCY OF EXECUTIVE FUNCTIONS ASSESSMENT AND INTERVENTION AMONG PRACTICING SCHOOL PSYCHOLOGISTS

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Dissertation Approval

This is to certify that the thesis presented to us by Meghan Garrett on the 2nd day of June, 2015, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Abstract

This study surveyed school psychologists (*N* = 167) primarily from six different states about their perceptions, knowledge, frequency, and application of executive functions assessment and interventions. The purpose of this study was to explore school psychologists' practices in executive functions assessment and interventions. Results of the study indicated that school psychologists vary in their knowledge of executive functions, but the majority of them do not include the assessment of and intervention in executive functions deficits in their regular practice. However, school psychologists tended to report executive functions assessment and intervention more frequently when presented with specific disability classifications (e.g. autism, specific learning disability, etc.). In addition, most school psychologists did not rate executive functions as important or relevant in psychoeducational evaluations. Findings also were consistent with previous studies indicating that school psychologists do not frequently use neuropsychological measures (such as the NEPSY) in their evaluations and do not receive adequate training in neuropsychological principals during graduate school. When applying executive functions knowledge to real-world situations, school psychologists reported using a variety of assessment and intervention strategies with children who demonstrated executive function deficits. Finally, the results indicated that school psychologists were more likely to assess executive functions if they were Nationally Certified School Psychologists (NCSPs), had 11 to 15 years of experience as a school psychologist, did not achieve a doctorate degree, and/or practiced in the state of Massachusetts. Based on these findings, recommendations were made about increased training, support, and legislation with regard to executive functions and school neuropsychology.

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Chapter 1: Introduction

Executive functions are vital to the everyday lives of children and adults. Although they are defined in many ways, the most common definition of executive functions is a set of cognitive capacities that act in a coordinated way to assist people in purposeful, goal-directed, and organized processing of perceptions, emotions, thoughts, and actions (McCloskey, Perkins, & Van Divner, 2009). A popular analogy portrays executive functions as the "conductor" of our thoughts and behaviors. However, to avoid the misperception that executive functions are a unitary cognitive construct, it may be more appropriate to characterize executive functions as the "the conductor and the section leaders" of the orchestra of our perceptions, feelings, thoughts and actions (McCloskey, 2014).

Research has demonstrated that executive functions are important to many domains of functioning, including fluid and crystallized intelligence, motor production, academic achievement, temperament and behavior, daily living skills, and self-regulation (Best, Miller, & Naglieri, 2010; Brydges, Reid, Fox, & Anderson, 2012; Hofmann, Schmeichel, & Baddeley, 2012; McCloskey & Perkins, 2013; McCloskey et al., 2009). Executive function deficits are also implicated in many different childhood disorders, such as attention deficit hyperactivity disorder (ADHD), autism spectrum disorders, and other neurodevelopmental disorders (Barkley, 1997; Happe, Booth, Charlton, & Hughes, 2006; Rowe, Lavender, & Turk, 2006). Therefore, it is essential that they are assessed when completing psychoeducational evaluations in the school setting of children who may have these disabilities.

Furthermore, executive function deficits often are comorbid with learning disabilities (LD), the most commonly identified category of educational disabilities. It is estimated that 36% of school-age children participating in special education services are identified with a learning disability (including reading, math, and/or written language) (Kena et al., 2014). ADHD-LD comorbidity is at an all-time high, with a mean of 45.1% in the most recent review of literature (DuPaul, Gormley, & Laracy, 2013). These rates suggest the importance of including executive functions in the assessment of and intervention in students with learning difficulties.

The Individuals with Disabilities Education Act (IDEA 2004) specifies that children referred for special education services need to be assessed in all areas of suspected disability in order to complete a comprehensive evaluation (IDEA, 2004). Recent special education case law shines light on this provision, as exemplified in the Supreme Court decision of *Forest Grove School District v. T.A. 557 U.S. 230 (2009)*. In this case, the school district was found to have denied a free and appropriate education (FAPE) due to a psychoeducational evaluation that did not assess processes such as attention, executive functions, and memory (Dixon, Eusebio, Turton, Wright, & Hale, 2011). Evaluating children's executive functions capacities is essential to the identification and remediation of possible educational disabilities.

Statement of the Problem

Although executive functions are an integral part of psychoeducational evaluations and intervention practices, no research has been conducted into school psychologists' frequency of and competency in executive functions assessment and/or intervention. It has been hypothesized that school psychologists do not incorporate

neuropsychological principles (including executive functions) in their practice due to lack of familiarity with the neuropsychological literature and lack of training in pediatric neuropsychology (Hynd, 1981; Walker, Boling, & Cobb, 1999). In addition, information from studies of school psychologists' related assessment practices suggests that they are not appropriately assessing executive functions. For example, in a national survey of school psychologists' assessment practices in the identification of ADHD, less than 4% of the respondents said that they frequently used direct measures of executive functions, such as the Trail Making Test, the Wisconsin Card Sorting Task, and Conners' Continuous Performance Task (CPT) (Koonce, 2007). Similarly, in a national survey of school psychologists, most participants indicated that they never included neuropsychological assessment tools in their evaluations (Slonaker & Pass, 2011).

These results suggest that despite increasing research in the assessment and importance of executive functions in children, school psychologists are not translating this research into their regular practice. Thus, the question remains: Do school psychologists frequently assess and intervene in executive functions? And more importantly, are practicing school psychologists competent in the assessment and intervention of executive functions?

Purpose of the Study

The purpose of this study was to explore whether school psychologists regularly include the assessment of executive functions in their psychoeducational evaluations. This inquiry included an examination of the measures and procedures commonly used to assess executive functions. An additional purpose was to examine whether school psychologists also recommend and conduct executive functions interventions based on

their assessment findings. It is important that school psychologists be able to follow best practices in the assessment of executive functions in order to appropriately link results to effective interventions. Possible reasons for why school psychologists do or do not assess executive functions, based on the literature, were also examined. Further information was gathered about school psychologists' knowledge of executive functions, perceived value of executive functions in educational disabilities, level of education, years of service, and amount of training specific to school neuropsychology and executive functions. In addition, school psychologists' competency of executive functions assessment and intervention were assessed using knowledge and application of best practices. The goal of this study was to explore school psychologists' practices in executive functions assessment and interventions.

Chapter 2: Review of the Literature

What are Executive Functions?

In order to become proficient in the assessment of executive functions, it is essential to have an accurate understanding of executive functions, their development over time, and their anatomical nature. In the past 20 years, there has been exponential growth in the research on executive functions, which has led to a more thorough understanding of their functions and purposes (Hughes, 2011). Current ideas and theories about the conceptualization of executive functions are below.

Definitions/models. In general, executive functions are the processes and/or capacities that enable us to regulate our thoughts, feelings, perceptions, and behaviors. In most models of executive organization, specific skills are defined in order to demonstrate the variety of functions directed by executive functions. Although organized in different ways, these executive functions models tend to describe similar sets of skills. For example, in their definition of executive functions, Dawson and Guare (2010) separate skills into two different categories: thinking/problem-solving and behavior guidance. Planning, organization, time management, working memory, and metacognition are categorized as capacities to assist us in the selection of goals and solutions to problems. Response inhibition, emotional control, sustained attention, task initiation, flexibility, and goal directed persistence are categorized as skills to guide our behavior as we move towards our goals (Dawson & Guare, 2010). Because several are common to many executive functions models and assessment tools, it is beneficial to provide a brief definition of select executive skills.

Planning is the ability to create a plan or anticipate events in the near future. This also involves being able to focus on and select what information is and is not important to reaching the goal (Dawson & Guare, 2010; McCloskey et al., 2009). Organization is the ability to keep track of information through the sorting, sequencing, and arranging of thoughts, feelings, perceptions, and behaviors (Dawson & Guare, 2010; McCloskey et al., 2009). Time management refers to the ability to stay within limits and deadlines and determine how much time to allocate for task completion (Dawson & Guare, 2010). It also includes being able to estimate how time is left in a specific period (McCloskey & Perkins, 2013).

Response inhibition is the ability to inhibit, suppress, and/or resist an urge to act, think, feel, or perceive on first impulse (Dawson & Guare, 2010; McCloskey et al., 2009). This skill allows us to think and evaluate before acting. Task initiation is the capacity to independently start a task and initially engage in thinking, feeling, perceiving, and acting. Sustaining attention involves the ability to maintain attention and sustain engagement with a task, thought, feeling, perception, or behavior. However, as with other cognitive capacities, this may be considered a facilitator/inhibitor of performance in some models, rather than a specific executive skill (Miller, 2013). A description of every executive capacity is beyond the scope of this paper; however, common skills have been briefly defined in order to provide additional information on the overall conceptualization of executive functions.

There is one cognitive capacity, however, that tends to be disputed among researchers regarding its inclusion as an executive function: working memory. Working memory is the ability to keep information in mind during complex tasks and use the information to

help complete the task. Although some researchers and theorists include working memory as an executive skill (Dawson & Guare 2010; Kaufman, 2010), the Integrated CHC/SNP (Cattell-Horn-Carroll/School Neuropsychological) model classifies working memory as a facilitator/inhibitor of cognitive processing and acquired knowledge (Miller, 2013). In this model, working memory is conceptualized as a requirement in the active manipulation of information; however, it is not categorized within the cognitive processes of executive functions. Similarly, in the holarchical model of executive functions, which will be more fully explained, working memory is not considered one of the many self-regulation capacities. In fact, it is generally considered a memory capacity and is not included in the comprehensive model (McCloskey & Perkins, 2013).

One of the most comprehensive and integrative models of executive functions, is the holarchical model of executive functions, which organizes skills into holarchical, developmental tiers (McCloskey & Perkins, 2013; McCloskey et al., 2009). In this model, self-activation is introduced as the first tier of executive processing, which involves the activation or waking up of capacities. In the next tier, there are 33 self-regulation skills that are each responsible for cueing and directing specific areas of functioning. Particular attention is also paid to the domains of functioning within which every executive function operates. For example, the modulate function regulates the intensity and amount of energy required for thinking, feeling, perceiving, and acting (McCloskey et al., 2009). This is also unique to McCloskey's model, as most theories tend to focus solely on the action or behavior domain.

Within the model, self-regulation executive functions are grouped within seven clusters based on similarities in their functions and/or research on the global neural

circuits of executive control: attention, engagement, optimization, efficiency, memory, inquiry and solution (McCloskey, 2014). In the attention cluster, the executive functions are perceive/aware, focus/select, and sustain. The engagement cluster is comprised of initiate, energize, inhibit, stop, interrupt, flexible, and shift. The executive functions in the optimization cluster are modulate, monitor, correct, and balance. The efficiency cluster is comprised of the functions of sense time, pace, sequence, and execute. The memory cluster is hold, manipulate, store, and retrieve. The inquiry cluster contains the functions of anticipate, gauge, analyze, estimate time and compare/evaluate. Finally, the solution cluster contains the functions of generate, associate, prioritize, plan, organize, and choose/decide. These self-regulation capacities cue and direct engagement in four general domains: perception, emotion, thought, and action (McCloskey & Perkins, 2013). People's attempts to engage executive functions can vary among the four domains, making it important to create a profile of executive functions use through comprehensive assessments.

Another unique quality of McCloskey's model is the discussion of arenas of involvement: intrapersonal, interpersonal, environment, and symbol system (McCloskey et al., 2009). As with domains of functioning, arenas of involvement indicate that executive functions also exist and vary within different contexts. In addition to the four domains, the variability in engagement with executive function skills also depends on these arenas of involvement (McCloskey & Perkins, 2013). These arenas help explain the observable differences in the use of executive functions when people are directing themselves based on their own internal states (intrapersonal arena), in relation to others (interpersonal arena), in relation to the environment (environment arena), or in relation to

symbol systems used to process and share information (symbol system arena). The intrapersonal arena refers to a person's thoughts, feelings, perceptions, and behaviors in relation to himself/herself. This includes how a person thinks, feels, or acts toward himself/herself and can affect a person's sense of self (McCloskey & Perkins, 2013). The interpersonal arena refers to a person's thoughts, feelings, perceptions, and behaviors in relation to other people. This includes theory of mind, understanding other people's perspectives, and balancing self needs with others (McCloskey & Perkins, 2013). In the environment arena, people direct their thoughts, feelings, perceptions, and behaviors in relation to the physical environment. Finally, the symbol system (academic) arena involves direction of thoughts, feelings, perceptions, and behaviors in the processes of reading, writing, mathematics, and language (McCloskey & Perkins, 2013). Executive deficits in the academic arena are common in people with learning disabilities; however, as will be further discussed, executive dysfunction and learning disabilities are not interchangeable terms.

The next tiers of executive processing focus on skills that extend beyond basic self-regulation. In the third tier, self-realization (self-awareness and analysis) and self-determination (long-term planning) are introduced. In the fourth tier, self-generation moves beyond the self to wondering about many existential topics, such as the nature of existence, the existence of God, and consciousness beyond the physical world (McCloskey et al., 2009). Although rare, the model also discusses a fifth tier called trans-self-integration, in which the person is able to reach a state of connectedness or "unity consciousness." Overall, the McCloskey model provides a comprehensive view of the organization and integration of executive function skills and capacities.

Development of executive functions. As with conceptual models of executive functions, there are also many theories about the development of executive functions throughout the lifespan. In the past, many developmental theories involved stages of development, including age ranges for meeting milestones and the identification of a normal trajectory common to every child. In the realm of executive functions, an early theory of anatomical development in higher cognitive functions was proposed in five stages by A. R. Luria (1980). Briefly, the stages moved from development of the brain stem and reticular activating systems in the first stage (first year of life) to the development of the frontal regions during the fifth stage (8 years through adolescence) (Luria, 1980). It is important to note that earlier models, such as Luria's, tended to identify the development of executive function in late childhood or early adulthood, with little to no development in early childhood. However, more recent studies examining brain development in young children and adults have demonstrated that the development of executive functions begins in infancy and continues throughout childhood and well into the adult years (Barkley, 1997; Lebel, Walker, Leemans, Phillips, & Beaulieu, 2008). McCloskey & Perkins, 2013; Taylor, Barker, Heavey, & McHale, 2013).

Luria's ideas about higher cortical development (Luria, 1980) continue to shape our theories about how executive functions develop throughout childhood. Although it is commonly believed that executive functions develop in unison with frontal lobe development in general, recent research suggests that each executive function may be on its own trajectory of neurological development (Brocki & Bohlin, 2004; Reynolds & Horton, 2008). For example, in a meta-analysis of more recent research studies, it was found that the trajectory for development of planning, verbal fluency, design fluency, and

inhibition of perseveration increased the fastest between ages 5 and 8 (Romine & Reynolds, 2005). Between ages 8 and 11, moderate increases across all executive functions were noted. Inhibition of perseveration continued to develop until age 14; however, no age differences were found after that period. In addition, planning and verbal fluency skills were found to continue to develop throughout adolescence, with an increase in performance into early adulthood (Romine & Reynolds, 2005). Other studies have also demonstrated a trajectory for the development of social skills and executive functions well into early adulthood (19 years old), including nonlinear patterns for letter fluency and concept formation and gender differences for measures of social cognition (Taylor et al., 2013). In addition, a review of brain maturation data shows that areas in the prefrontal-temporal region (associated with dementia) of the brain develop more slowly than other regions of the brain (Lebel et al., 2008). These findings suggest that the rate of development of executive functions varies across age ranges and specific skills.

One of the most widely known theories of executive function development was proposed by Barkley (1997). In his hybrid model of executive functions, he provides a sequence of development beginning in infancy with behavioral inhibition, which he believes to begin developing between 5 and 12 months. The next capacities in the sequence are nonverbal working memory, internalization of speech (verbal working memory), self-regulation of affect/motivation/arousal, and reconstitution, or the analysis and synthesis of behavior (Barkley, 1997). Each of these skills begins development at later stages of childhood, with continued increases over time. The earliest signs of reconstitution are proposed at the age of 6 years. At this age, Barkley believes that

children are able to demonstrate motor control/fluency/syntax, which includes more independence and problem solving skills (1997).

It has also been suggested that executive functions development can vary greatly from person to person, with the ability to reach higher level skills without the full development of lower level skills (McCloskey et al., 2009). In fact, the holarchical model of executive functions allows for the fluid and dynamic development of executive functions without the limitations of "age or stage" developmental models (McCloskey & Perkins, 2013). The literature also suggests that quality of parenting and appropriate structuring of a child's environment can help develop executive capacities and compensate for executive functions immaturity as a child moves through this developmental process (Blair, Raver, Berry, & Family Life Project Investigators, 2014; Dawson & Guare, 2010). Although theories of executive development may have changed over time, they continue to stress the importance of frontal lobe maturity and individual developmental differences.

Neuroanatomy of executive functions. In order to more fully understand executive functions, a basic understanding of the related neuroanatomy is important. As previously noted, executive development is dependent on the maturation of the frontal lobes, which have been the main brain area associated with executive functions. In Luria's (1973) model of neuropsychology, he posited that executive skills were a function of the third brain unit, and that the primary purpose of the frontal lobes was to regulate movement and actions. He referred to the frontal lobes as the "superstructure" over all other brain area (Luria, 1973). In more recent years, executive function processes are usually linked to the anterior regions of the frontal lobe, called the prefrontal cortex (PFC) (Maricle,

Johnson, & Avirett, 2010). Two major functions of the PFC are cognitive flexibility (cognitive set shifting) and response inhibition, which are also two major skills identified as executive functions. Modern theories also suggest the existence of pathways that originate in the PFC and connect with other areas of the brain to produce executive functions.

Frontal-Subcortical (FSC) circuits are excitatory and inhibitory pathways that connect subcortical regions of the brain to the frontal cortex. Although there are approximately seven pathways discussed in research, three FSC circuits appear primarily related to executive functions (Miller, 2013). The dorsolateral prefrontal circuit (DLPFC) is considered the "executor of the brain" and is involved in multiple executive functions, especially those needed for academic tasks in school (Miller, 2013). The DLPFC has been associated with maintaining and shifting set, organizing strategies, sustaining attention, and inhibiting responses (Maricle et al., 2010). In addition, deficits in the dorsolateral prefrontal circuit have been described as the "classic signs of attention deficits and executive dysfunction" (Hale & Fiorello, 2004, p. 64). These classic signs were further explained as deficits in planning, strategizing, evaluating, monitoring, changing behavior, and shifting.

The orbitofrontal circuit is primarily involved with the integration of emotional functions, due to its connections with the limbic system. It helps regulate social decision making and socially appropriate behaviors (Miller, 2013). The orbitofrontal circuit is also associated with impulse control and the maintenance of continual behavior (Maricle et al., 2010). Dysfunction in this circuit can lead to emotional lability and disinhbition (poor self-control) (Hale & Fiorello, 2004). However, there may be differences in behavior,

depending on the location of the dysfunction (left vs. right). For example, damage to the left orbitofrontal circuit may lead to negative affect, pseudodepression, or excessive emotional regulation. Right hemisphere damage may lead to pseudopsychopathy, indifferent affect, or lack of emotional regulation (Hale & Fiorello, 2004). However, these are hypothesized differences and continue to be investigated through research.

The anterior cingulate regulates motivation and initiation processes (Miller, 2013). This circuit is important when evaluating students with apathy and difficulty with response inhibition. This circuit is also associated with error detection, response monitoring, divided attention, and conflict resolution (Maricle et al., 2010). Dysfunction in the anterior cingulate can cause problems with persistence, motivation, and monitoring of performances (Hale & Fiorello, 2004).

Studies including magnetic resonance imaging (MRI) and functional MRI (fMRI) results, as well as analyses of executive function deficits over time, have demonstrated that executive functions performance is also related to the volume of the PFC, the volume of white matter hyperintensities in the prefrontal region, inferior frontal sulcus, the middle frontal gyrus, and the intraparietal sulcus (Gunning-Dixon & Raz, 2003; Szameitat, Schubert, Muller, & Von Cramon, 2002). Research continues to locate brain regions and cortical areas that are involved in executive functions performance and deficits, indicating their overall importance and vitality in brain functioning.

Through this brief review of the neuroanatomy of executive functions, the function and importance of frontal cortex loops is clear. Additionally, it is essential to understand the interconnectivity between the FSC circuits and the rest of the brain. This provides the network needed to integrate, oversee, and coordinate complex behaviors and cognitive

processing (Maricle et al., 2010). Executive functions are housed in the frontal lobes; however, it is the frontal lobes' connections to other brain areas that result in the perceptions, feelings, thoughts, and actions that reflect the involvement of executive functions.

Best Practices in the Assessment of Executive Functions

As is typical in the measurement of any cognitive construct, it is important to utilize multiple assessment procedures across multiple settings when attempting to evaluate executive functioning. In addition, the assessment of executive function skills should be based on the identification of strengths and needs, the exploration of problems, and the link to effective, research-based interventions (McCloskey et al., 2009). In this portion of the paper, evidenced-based best practices in the assessment of executive functions will be introduced, with discussions of the strengths and weaknesses of each.

Informal measures. Informal measurement includes use of procedures that are not standardized or normative of a representative population. They typically provide narrative, qualitative information that can be used as part of a comprehensive assessment battery. Although typically used in all forms of psychoeducational assessment, there are some strategies that are specific to the measurement of executive functions: classroom observations, interviews, and case history reviews.

Interviews and case history. Obtaining a thorough case history relative to the student's developmental and medical histories is essential when assessing executive functions. This can help the examiner determine the onset of skill deficits and identify potential contributing factors. Questions should focus on early risk factors, pregnancy/birth complications, atypical development, medical/health information, and

current cognitive and behavioral functioning (Maricle et al. 2010). This type of information can also be gathered from a record review; however, follow-up questions and clarifications by the parents may be required.

Parent, teacher, and self-report interviews are also important informal measures of executive functions. They can provide information about each informant's perceptions of the skill deficits and the extent to which they affect the student's everyday life functions. Although it is acceptable for examiners to use their own open-ended questions relative to self-regulation, problem solving, and academic processes, semi-structured interview formats have also been developed (McCloskey et al., 2009). Dawson and Guare (2010) provide interviews in parent, teacher, and student versions. In the parent and teacher interviews, the examiner asks how the child performs in different areas of executive function skills and asks the interviewee to list types of assignments in which the student would excel and not excel. Parents and teachers are also asked to reflect on their own executive function capabilities and how that might affect the student (Dawson & Guare, 2010). In the student version of the interview, questions are grouped into different tasks (e.g. homework, long-term projects, and household chores), and the examiner asks about difficulties in each area. Students also provide information about their goals and any plans or obstacles in meeting them.

Similarly, McCloskey, Perkins, and Van Divner (2009) also created semi structured interviews of executive functioning. The Executive Function Structured Interview (EFSI) exists in two forms, one for parents/teachers and one for students. The interviews provide open-ended questions directed at each of the basic self-regulation skills, as well as questions about the student's daily routines and sleeping behaviors. The examiner is also

directed to gather information about domains of functioning and arenas of involvement for areas of skill deficits. Another interview created for the examination of executive functions is the Executive Functioning Semi-Structured Interview (Kaufman, 2010). The interview includes parent, student, and teacher forms in order to examine student performances in areas of goal setting, decision making, materials organization, time management, working memory, impulse/emotional control, and set shifting. The interviewee rates each item on a scale from *not a problem* to *definite problem* in order to identify areas of executive strengths and needs (Kaufman, 2010).

Collecting data through case histories and interviews allows the examiner to evaluate a variety of perceptions of the student's executive function skill deficits. In addition, information can be collected that would otherwise be impossible for the examiner to observe, such as behavior in the home and community settings. However, the weaknesses of these measures include threats to validity and reliability. Parents, teachers, and students are providing their subjective thoughts and feelings, which may not accurately reflect a student's actual skill level. In addition, there can be differences in the interviewees' feelings about the intensity and effect of executive functions deficits. For example, a teacher may respond with concerns about the student's level of activity in the classroom, but the parent may not perceive this as a problem. However, when paired with other forms of assessment, case histories and interviews can provide crucial data for psychoeducational evaluations.

Classroom observations. Classroom observations are an important part of the assessment process, as they allow the examiner to observe children's executive skills in the typical classroom environment. An effective series of observations can provide

information about the specific skill deficits, possible interventions, and the effectiveness of previously implemented interventions and accommodations (Dawson & Guare, 2010). It is also common for observations to include narrative information about the student's behaviors, but also provide some quantitative data in the form of percentages, tallies, and/or lengths of time. These data can include the percentage of time on task, length of time needed to begin a task, number of times calling out versus raising a hand, number of required redirections/prompts, and many other measurements that provide essential information about the student's executive function skills in the daily environment (Dawson & Guare, 2010).

However, it can be sometimes difficult to determine what behaviors to observe in the classroom and how to collect data that is specific to each skill. Therefore, checklists were developed in order to assist clinicians in structuring classroom observations. The Executive Function Student Observation Form (EFSO) and the Executive Function Classroom Observation Form (EFCO) are tools that allow observers to determine executive function demands in the classroom and evaluate whether the student demonstrates the skills needed to meet those demands (McCloskey & Perkins, 2013; McCloskey et al., 2009). For each of the basic self-regulation skills proposed in the holarchical model, the tool prompts the observer to indicate whether the student exhibits the behavior and if the teacher provided appropriate prompts when needed. Use of this tool can assist observers in structuring their observations around the student's executive skills and ensure that each skill is considered in relation to the student's classroom behavior.

Although observations, when completed using best practices, can provide useful information about a student's executive functioning in the environments in which they typically occur, there are several weaknesses with this type of measurement. First, classroom observations can only measure executive skills in the behavior domain of functioning (McCloskey et al., 2009). However, students may experience deficits in more internal domains as well, such as thinking, feeling, and perceiving. Secondly, observations can vary in validity and reliability, due to the nature of the contexts and the behaviors of other students and teachers in the room. Despite these weaknesses, classroom observations in a variety of settings are important as part of a multi factor psychoeducational evaluation.

Behavior checklists and rating scales. Behavior checklists and rating scales are commonly used when assessing children's social/emotional/behavioral functioning. However, they are also important in the measurement of executive functions, as they are able to provide insight into the severity of skill deficits as compared to a normative population of the same age and/or gender (McCloskey et al., 2009). Although behavioral scales that are specific to executive function skills are limited, the use of more general social/emotional/behavioral scales can be helpful in differential diagnosis and in measuring related constructs such as attention (Dawson & Guare, 2010). The following is a brief description of several popular behavior rating scales and their use in the assessment of executive functions.

Behavior Rating Inventory of Executive Functions (BRIEF). The BRIEF is a rating scale for parents, teachers, and students that is designed to measure a variety of executive skills in the home and school settings (Gioia, Isquith, Guy, & Kenworthy, 2000). Raters

are asked to indicate the frequency of behaviors separated into eight clinical scales, which are grouped into two broad categories. The behavioral regulation scales are inhibit, shift, and emotional control. Scales in metacognition are initiate, working memory, plan/organize, organization of materials, and monitor (Gioia et al., 2000). Ratings are converted into T scores based on the student's age and gender, which are then used to determine behaviors that occur significantly more often than in a sample of the general population. The BRIEF is popular in the assessment of executive functions, and it has been supported as a clinical tool in the diagnosis of executive function disorders, including ADHD (McCandless & O'Laughlin, 2007; Toplak, Bucciarelli, Jain, & Tannock, 2009). However, there may be criticisms of the BRIEF's conceptualization of executive functions, especially related to the inclusion of working memory as an executive capacity. In addition, the eight clinical scales of the BRIEF do not represent all of the possible executive functions described in more comprehensive models, and more than one executive skill is included within each scale (McCloskey & Perkins, 2013). Therefore, it may be beneficial to integrate tools that offer more thorough analyses of executive functions into the assessment battery.

McCloskey Executive Functions Scale (MEFS). The McCloskey Executive Functions Scale (MEFS) is a norm-referenced rating scale for parents/teachers and students (McCloskey, 2011). Informants are asked to rate the frequency of the student's behaviors in a variety of skill categories. These are based on the self-regulation skills that are described in the holarchical model of executive functions (McCloskey et al., 2009). For example, within the initiate section, parents and teachers are asked to rate the student's frequency on a scale from *never a problem* to *very often a problem* in five

examples of task initiation skills. Items also exist for other tiers of self-control, including self-realization, self-determination, and self-activation. This scale is currently in development and will add to the very limited number of rating scales specific to the measurement of executive functions.

Executive Skills Questionnaire for Parents/Teachers and Students. Although not norm-referenced, the Executive Skills Questionnaire is a set of two checklists for parents/teachers and students that examines student executive function skills (Dawson & Guare, 2010). The questionnaire is comprised of 21 items divided into categories based on basic skill areas. Raters are asked to indicate the intensity of the behavior from one (*No problem*) to five (*Big problem*). In this sense, the Executive Skills Questionnaire allows examiners to identify both skill deficits and skill strengths (Dawson & Guare, 2010). However, it is not suggested as a substitute for rating scales that provide standardized, norm-referenced scores.

Barkley Deficits in Executive Functioning Scales (BDEFS). The BDEFS is a scale that was initially developed for adults, but has been adapted for assessment of executive function deficits in children and adolescents (ages 6 to 17). The BDEFS is theoretically based on Barkley's hybrid theory of executive functions and was empirically developed using the most reliable and valid executive dimensions in daily life (Barkley, 2012). It is a norm-referenced scale that includes a long form, a short form, and an interview. Items are divided into sections based on dimensions of self-management: time, self-organize, self-restraint, self-motivate, and self-regulate emotion. The BDEFS also provides an EF Summary Score, an EF Summary Count, and ADHD-EF Index. These additional scores allow raters to summarize students' deficits and predict the likelihood that students are

demonstrating executive deficits related to a diagnosis of ADHD (Barkley, 2012). In a review of the BDEFS, it was described as conceptually grounded in current executive functions research and the only behavior rating scale to examine executive deficits in everyday life over a long period (Allee-Smith, Winters, Drake, & Joslin, 2013).

Comprehensive Executive Function Inventory (CEFI). The CEFI is a nationally normed rating scale that can be used to develop profiles of executive functions strengths and weaknesses for children ages 5 to 18 (Naglieri & Goldstein, 2012). The inventory includes parent, teacher, and self-rating forms, with emphasis on assessment guidance and treatment planning. Items are divided into nine clinical scales to pinpoint areas of intervention: attention, emotion regulation, flexibility, inhibitory control, initiation, organization, planning, self-monitoring, and working memory. In test reviews, the CEFI is described as a robust and statistically sound scale that provides information specific to children's executive functions strengths and weaknesses (Climie, Cadogan, & Goukon, 2014; Primus, Warnick, Svenkerud, & Greene, 2014). However, more information is needed about its use with clinical populations, including traumatic brain injury and other neurological disorders.

Behavior Assessment System for Children, Second Edition (BASC-2). The BASC-2 is a set of rating scales in parent, teacher, and self-report forms that assesses a variety of student behaviors in three different age groups: preschool, child, and adolescent (Reynolds & Kamphaus, 2007). Informants rate the frequency of student behaviors in a variety of categories: externalizing problems, internalizing problems, and adaptive skills. The rating scale also includes several individual scales, such as atypicality, withdrawal, and attention problems. Although it is not specific to executive skills, items from the

BASC-2 have been supported as a future screening tool for executive skill deficits (Garcia-Barrera, Kamphaus, & Bandalos, 2011). In addition, test makers have developed software for parent and teacher rating forms, through which examiners can obtain scores for emotional self-control and executive functioning scales. Similarly, a frontal lobe/executive control (FLEC) scale has been derived from the parent rating form of the BASC-2 which has been indicated as an effective measure of executive function skills. In a study of 92 children and adolescents, researchers found that participants previously diagnosed with ADHD and other clinical diagnoses linked to executive function deficits scored higher on items of executive dysfunction than participants in the non-clinical group (Sullivan & Riccio, 2006). Concurrent validity was also found between scores on the FLEC with similar measures of executive functions, such as the BRIEF Parent Form and the Conners' Rating Scales Revised-Parent-Short Form (Sullivan & Riccio, 2006). Considering these findings, the researchers concluded that the FLEC scale of the BASC-2 is a promising measure of executive functions.

Scales specific to ADHD. Although not direct measures of executive functions, behavior rating scales specific to ADHD identification can offer information about various executive capacities. For example, the Conners 3rd Edition (or Conners 3) is a norm-referenced scale aimed at the identification of ADHD and other comorbid disorders in children and adolescents (Conners, 2008). The items are based on criteria of several *Diagnostic and Statistical Manual of Mental Disorders* (DSM) diagnoses, including ADHD, conduct disorder, and oppositional defiant disorder. In the 3rd edition, an executive functioning scale was added, including questions about task completion, set shifting, and response inhibition. The Brown Attention-Deficit Disorder Scales (BADDS)

recently added a version for children (previously only for adolescents and adults). In this measure, items include information about hyperactivity, inattention, and executive functions (Brown, 2001). Areas of executive functions include organizing, prioritizing, focusing, sustaining, shifting, regulating alertness, processing speed, working memory, self-regulating action, and managing frustration. According to research reviewed in previous sections, it may be beneficial to include a behavior rating scale specific to ADHD, especially if the student is displaying a pattern of executive dysfunction related to hyperactivity, impulsivity, or inattention.

Overall, behavior checklists and rating scales provide ratings of children's behaviors in their daily environments, as compared to a sample of the general population (Dawson & Guare, 2010). This can help examiners determine if a student's executive skill deficits are developmentally typical of a child with similar characteristics. However, at this time, rating scales are limited to parent, teacher, and self-report forms, and there are very few scales targeted to measure specific executive skills (McCloskey et al., 2009). Due to these strengths and weaknesses, behavior checklists and rating scales should be used as one part of a comprehensive evaluation of executive functions.

Direct formal measures. Until this point, indirect measures and procedures have been the focus of the assessment discussion. However, in order to fully understand a student's executive functions, direct measures should also be used. Before exploring some common testing tools, it is important to understand some of the broad issues in the direct measurement of executive skills. First, the majority of instruments developed for executive functions in the past were intended for adults, with little research demonstrating their effectiveness in children (Maricle et al., 2010). In addition, because

executive functions encompass a variety of skills and abilities, no one test is sufficient in measuring executive functions in total. This is further complicated by the variable nature of executive functions tasks, indicating that they may be assessing several skills, or other constructs, at once (Miyake et al., 2000).

There are also several assessment challenges that are specific to using direct measures of executive functions in children. Particularly in young children and preschoolers, it can be difficult to determine what constitutes a measure of executive skills, especially considering that something novel or complex to one child may be over learned or simple for another (Anderson & Reidy, 2012; Stuss & Alexander, 2000). In addition, issues of motivation and level of interest vary greatly in children, which can lead to variability in scores (Anderson & Reidy, 2012). Due to these assessment challenges, it is important for examiners to use a variety of assessment measures over several testing sessions in order to obtain a comprehensive picture of a student's executive functions.

The Developmental Neurological Assessment, Second Edition (NEPSY-II). The NEPSY-II is a battery of tests, based on Lurian theory, that are specifically meant to assess the neuropsychological functioning of children (Korkman, Kirk, & Kemp, 2007). These tests measure functioning in six domains: attention/executive functions, language, sensorimotor functions, visuospatial processing, memory and learning, and social perception. Tests within these domains can be given in combination or individually in order to provide information about specific cognitive hypotheses (Maricle et al., 2010). Within the attention/executive functions are tests that measure simple sustained attention to complex behavioral and cognitive set shifting. Tests are: animal sorting, auditory

attention and response set, clocks, design fluency, inhibition, and statue (Kemp & Korkman, 2010). For example, in animal sorting, children are asked to rely on their concept generation, problem solving, and self-regulation skills in the evaluation cluster in order to sort cards into two different groups. The cards may be sorted by color, border, attributes related to the animals, attributes related to the backgrounds, etc. The attention/executive functions domain is considered a valid measure of selective and sustained auditory attention, problem solving, inhibition, self-regulation and monitoring, vigilance, and cognitive flexibility (Maricle et al., 2010). However, there is little research about the efficacy of the NEPSY-II in measuring specific self-regulation skills.

The Delis-Kaplan Executive Function System (D-KEFS). Similar to the NEPSY-II, the D-KEFS is battery of standalone tests that can be used in combination or alone to measure executive functions (Delis, Kaplan, & Kramer, 2001). However, the D-KEFS is designed for children, adolescents, and adults. It is not based on any single theoretical orientation, but uses nine tests that are empirically linked to the detection of skill deficits (Maricle et al., 2010). The eight tests that are normed for children are: word context test, sorting test, twenty questions test, tower test, color-word interference test, verbal fluency test, design fluency test, and trail making test. For example, in the verbal fluency test, children are asked to say names with a certain first letter and objects that fit into specific categories. In all trials, the children are asked to say as many names or objects as they can within a certain time limit. This task relies on verbal fluency, set shifting (in a trial where children are asked to switch between object categories), and other self-regulation capacities in the engagement, efficiency, and memory clusters. The D-KEFS purportedly measures a variety of executive function skills in both verbal and nonverbal capacities.

However, as with the NEPSY-II, there has been limited research completed, especially with children (Maricle et al., 2010).

Test of Everyday Attention for Children (TEA-Ch). The TEA-Ch is another standalone battery of tests developed for children; however, it focuses on the assessment of selective and sustained attention (Manly, Robertson, Anderson, & Nimmo-Smith, 1999). The TEA-Ch is based on the theoretical organization of attention by Mirsky et al., which states that there are three elements of attention: focus, sustain, and shift (Mirsky, Anthony, Duncan, Ahearn, & Kellam, 1991). Attention is measured in nine subtests: sky search; score!; creature counting; sky search DT (dual task); map mission; score DT; walk, don't walk; and opposite worlds. Although the TEA-Ch tests are interesting to children due to their game-like formats, they have not been standardized in the United States (Miller, 2013).

Wisconsin Card Sorting Test-Revised and Expanded (WCST). The WCST has been widely used in adult neuropsychology to measure a variety of executive function skills (Heaton, Chelune, Talley, Kay, & Curtiss, 1993). It is a sorting task that traditionally utilizes a deck of cards; however, computer-based versions have been developed. The WCST is standardized for children beginning at age 6 and measures cognitive set shifting, problem solving, sustained attention, concept formation, and response inhibition (Maricle et al., 2010). In this task, children are asked to determine the correct sorting rule for cards with different shapes, colors, and numbers on them. The WCST has been demonstrated as a valid measure of executive functions (Heaton et al., 1993). In a meta-analysis of children's performances on the WCST, it was found to indicate underlying neurological problems, most likely in the frontal lobes (Romine et al., 2004).

No matter which battery is used, researchers support the use of a variety of neuropsychological tests when measuring children's executive functions (Horton, Soper, & Reynolds, 2010; Schmitt & Wodrich, 2008). A comprehensive evaluation of executive functions typically includes a perceptual motor measure (trail making), a categorization/classification task with limited motor demand (card sorting), and verbal retrieval task (phonetic and semantic fluency) (Horton et al., 2010). In addition, research supports use of assessments that measure concept formation, problem solving, planning, response inhibition, reasoning, and qualitative behaviors during testing (Miller, 2013). However, there are several weaknesses in the use of standardized measures. For instance, many of the tests have small sample standardization sizes for children (Kemp & Korkman, 2010; Maricle et al., 2010). In addition, executive skill deficits are less likely to surface in one-on-one contexts, most formal tests are highly structured and predictable, and demands of some executive functions assessments are poorly correlated with real-world functioning (Kaufman, 2010).

Considering these inherent problems with direct measures, it is best to use a variety of methods when assessing students for executive functions deficits. However, the importance of direct, neuropsychological assessments cannot be overlooked (Schmitt & Wodrich, 2008). Using direct measures assists school psychologists in determining why a student is having a particular academic or behavioral deficit in order to develop effective intervention strategies (Cleary & Scott, 2011; Miller, 2013; Schmitt & Wodrich, 2008). By using a variety of measures, including direct, neuropsychological assessments, a school psychologist is able to adequately conceptualize a student's executive function profile.

Best Practices in Executive Functions Interventions

Once a thorough conceptualization of a student's executive functions strengths and needs is obtained in the assessment process, the next step is to recommend evidence-based interventions. It is important to recognize that targeted interventions can both alter brain functioning and cue the use of intact brain functions (McCloskey et al., 2009). As previously noted, executive dysfunctions are caused by deficits and/or under development in brain areas. By choosing interventions that appropriately meet the child's needs, a school psychologist cannot only change that student's behaviors, but also optimize that student's brain functioning. The subsequent portion of this discussion will describe evidence-based best practices in the intervention for executive function deficits.

Linking assessment to intervention. Common to other forms of cognitive and academic assessment, it is essential for examiners to link the assessment of executive functions to effective, evidence-based interventions. This can be accomplished using a step-by-step process that translates collected data from multiple assessment sources to interventions. Dawson and Guare (2010) explain the steps as analyzing behaviors to determine which capacities are deficient and then choosing a capacity to become the target for intervention. A behavioral goal is developed, and an intervention is designed to reach that goal. Critical considerations in intervention development are: incentives or rewards that will be used to motivate the student's behavior, skills that will be taught and shaped and the type of instruction that will be used, and accommodations or environmental modifications that will be put in place to support the student (Dawson & Guare, 2010).

In addition, a process-oriented approach to assessment can be utilized when completing direct measures with students. In this type of assessment, the examiner uses observations of the student's behaviors to hypothesize how the student is performing the task (McCloskey et al., 2009). This assists the examiner in establishing a pattern of performance over several measures, which is indicative of the student's executive function capacities. Part of a process-oriented approach to assessment is the process-oriented rational task analysis (PORTA) (McCloskey & Perkins, 2013). In this process, the examiner considers the assessment format, the assessment content, the specific abilities, processes, lexicons, or skills (APLS) that are being cued and directed, and the specific executive functions that will most likely be used to cue and direct the APLS. The purpose of the PORTA is to identify the self-regulations that are most likely being used in the successful performance of the task. Other strategies in the process-oriented approach of executive functions assessment are the cascading production decrement (CPD) analysis and the cascading production increment (CPI) analysis (McCloskey & Perkins, 2013). Both of these analytic strategies involve the consideration of task performance as executive demands increase and decrease. For example, if a student's task performance deteriorates as executive demands increase (CPD) and improves as executive demands lessen (CPI), then it is likely that the student is experiencing executive functions deficits Once the student's self-regulation skills are evaluated based on these process observations, the examiner can design specific interventions to target executive skill deficits (McCloskey et al., 2009). Whether measuring executive functions or any other cognitive or academic capacity, it is important to link assessment findings to useful, research-supported interventions.

Strategies for external control. When initiating interventions for a student with executive function deficits, it typically recommended to first change the external environment and variables outside of the child (Dawson & Guare, 2009). This can include verbal and nonverbal cues, altering the length and/or complexity of an assignment, allowing breaks during instruction, repeating directions, matching tasks to meet the student's strengths, implementing a behavior chart, etc. The main commonality between all of these strategies is that aspects of the student's environment (e.g. adults, assignments, and lessons) are adapted or changed. Interventions involving external control are sometimes described as providing students with a "surrogate prefrontal lobe," as the children are receiving the support they need from outside sources (Kaufman, 2010). The students are not necessarily internalizing or learning their own ways to overcome executive function deficits.

Changing the physical environment. Sometimes adaptations to the student's physical environment can smooth executive functions deficits (Dawson & Guare, 2009, 2010). This may involve removing certain stimuli from the environment, changing the way the physical environment is organized, and/or adding something to the environment to improve the student's executive functions (Dawson & Guare, 2010). For example, a student who has difficulty with selective attention may be better seated at the front of the classroom and away from doors or windows, which can be sources of visual/auditory distractions. Other examples of physical adaptations include limiting the amount of visual stimuli on classroom walls, reducing auditory distractions using headphones, limiting the areas of the classroom that can be accessed by students, and providing organizational structures like cubbies, bins, shelves, and hanging hooks (Dawson & Guare, 2009;

McCloskey et al., 2009). Research has demonstrated that physical changes to the environment (e.g. seating a student near attentive peers and away from auditory and visual distractions) can be effective ways to increase selective/sustained attention and other executive functions in students diagnosed with ADHD (Haake, 1991; Reiber & McLaughlin, 2004). Changes to the physical environment are generally easy for school staff to implement, making these interventions popular in the school setting; however, in order to fully support students with executive function deficits, other interventions may need to be utilized, as well.

Changing to the nature of the task, schedule, and/or time. Although changing the physical environment can be effective for students with executive functions deficits, sometimes changes to the actual tasks and/or school schedule need to be explored. Because students with executive functions deficits are already having difficulty organizing their thoughts, feelings, and/or behaviors, the schedule of tasks and the tasks themselves may need to be adapted to reduce the load of executive demands. For example, students may require shortened tasks, frequent breaks between tasks, explicit directions, built-in choice or variety of tasks, and tasks that are designed to seem like games or competitions (Dawson & Guare, 2009). These changes may also be applied to tests and quizzes in order to reduce the amount of planning and time needed to complete them. For example, students with executive functions deficits may require reduced multiple choice responses, word banks provided for fill-in-the-blank questions, and close-ended responses rather than essay responses (Dawson & Guare, 2010).

Additionally, students with executive functions deficits tend to have difficulty controlling their thoughts, feelings, and behaviors when under conditions of external

demand (e.g. completing a task that they were told to complete, rather than a task that was self-selected). It can become overwhelming for a student with these deficits to complete a task involving executive functions under sudden external demands and with the expectation for immediate compliance (McCloskey et al., 2009). Therefore, it is important to adapt the educational schedule to align with the student's internal desires, as well as to strategically pair undesired activities with desired activities. Although incentive programs will be discussed in a later section, it can be beneficial to schedule a task that is internally motivating after a task that is externally driven (Dawson & Guare, 2010; McCloskey et al., 2009).

Changing prompts/cues and feedback. Providing students with self-regulation cues is the most widely used external intervention for students with executive functions deficits; however, its importance is often not acknowledged (McCloskey et al., 2009). Providing direct and concrete prompts and cues can be an important part of assisting students with executive functions deficits. For example, when working with a child who has response inhibition difficulties, prompts and cues should be specific to resisting the urge to act on first impulse (e.g.. "Don't start until I tell you to go") (McCloskey et al., 2009). Other examples of prompts and cues include making a list of steps to complete a task, using homework assignment books or agendas, rehearsing what to do and how to handle situations, and using nonverbal cues (e.g. tapping a student's desk, picture cues, and hand gestures) (Dawson & Guare, 2010; McCloskey. Perkins, & Van Divner, 2009). One specific tool called the MotivAider (2000) has been shown to help students increase their classroom attention by increasing self-monitoring of inattentive behaviors (Amato-Zech, Hoff, & Doepke, 2006). The MotivAider (2000) is an electronic paging device that

vibrates to provide a tactile prompt to the student, who can then refocus himself/herself back to the task at hand. In sum, cues that are specific to activating a particular self-regulation capacity can assist students in determining how to think, feel, or act in specific situations.

In addition, feedback provided after the student has completed a task can be helpful in encouraging use of self-regulation skills in the future. Research has demonstrated that immediate and specific feedback can be beneficial in changing the behaviors of students diagnosed with ADHD, specifically in inhibiting verbalizations (Price, Martella, Marchand-Martella, & Cleanthous, 2002). Praise is one type of feedback that may be used. However, it is important to note that praise should always be specific to the skills that the student demonstrated (Dawson & Guare, 2010). For example, when working with a student who struggles with response inhibition, a teacher may say "I like how you waited until I called on you before asking your question." It may also be beneficial to debrief the student after a task and talk about what worked, what didn't work, and what can be changed for next time (Dawson & Guare, 2009b).

Incentive programs/behavior charts. As previously discussed, it can be difficult for children with executive functions deficits to complete tasks with high external demands. However, this occurs for two very different reasons (McCloskey et al., 2009). The first reason is the task is too difficult, causing the child to become unmotivated to complete it. In this case, direct instruction, teaching strategies, and using the interventions previously discussed may be the best course of action (Dawson & Guare, 2009). The second reason is that the task may not be interesting to the child, even though it is well within his/her skill level, causing the child not to complete the task. In this case, it may be beneficial to

use an incentive program and/or a behavior chart to motivate the child to complete the task (Dawson & Guare, 2009). However, it is important to note that incentive programs should be used with caution because they operate under the assumption that the student already possesses the executive skill or demand required to complete the task (McCloskey et al., 2009). Students may become easily frustrated and/or annoyed if rewards are taken away for something that they perceive to be too difficult or beyond their skill level.

Token reinforcement, response cost, and other behavior management systems are the most widely researched interventions for ADHD other than stimulant medications (Reiber & McLoughlin, 2004). For children with ADHD and other executive functions deficits, it is important to develop behavior management and reinforcement systems based on a comprehensive analysis of the functions of the target behaviors (DuPaul, Weyandt, & Janusis, 2011; Pfiffner, Barkley, & DuPaul, 2005). In addition, the incentives and rewards provided in such programs may need to be given at a higher frequency, intensity, and duration than for typically developing children, with frequent monitoring and adaptations in order to maintain the power of the program. Incentive programs like token economy systems can be effective in decreasing problem behaviors and increasing academic achievement in children with ADHD and other executive function deficits and should be considered when developing interventions for these students (DuPaul et al., 2011; Reiber & McLoughlin, 2004).

Pharmacological interventions. Pharmacological treatment is the most widely used intervention for students with symptoms of ADHD and executive functions deficits (McCloskey et al., 2009; Reiber & McLoughlin, 2004). An overwhelming amount of

research suggests that the dopamine agonist methylphenidate (Ritalin) and other stimulant medications are highly effective in treating the associated executive functions and behavioral deficits associated with ADHD (Hale & Fiorello, 2004). However, other medications, including atypical antipsychotics, are also used with children demonstrating ADHD symptomatology. In a meta-analysis, researchers were able to demonstrate significant differences in the efficacy of stimulant vs. non stimulant medications (Faraone, Biederman, Spencer, & Aleardi, 2006). Stimulants were found to be most efficacious in the treatment of ADHD symptoms. However, there are several problems with the use of pharmacological treatment, such as individual children's varying responses to medications and the lack of academic gains when using a medication-only approach to intervention (Hale & Fiorello, 2004). Therefore, it is typically recommended that pharmacological intervention be used in conjunction with other behavioral and cognitive strategies when working with children with executive functions deficits.

Bridging strategies. As previously noted, the goal for executive functions interventions is for children to move from strategies of external control to strategies of internal control. In order to appropriately scaffold this transition from external to internal strategies, there are several "bridging strategies" that can be utilized (McCloskey, Gilmartin, & Stanco, 2014). As these bridging strategies become more effective, the strategies of external control should be phased out.

Counseling and manual-based programs. Whether individually or in groups, counseling can be an effective way to help students develop an understanding of their own executive strengths and needs and determine ways of compensating or overcoming those needs. Particularly, there has been much research outlining the use of cognitive-

behavioral therapy (CBT) with executive functions. Briefly, CBT is a type of therapy that focuses on the connection between thoughts, feelings, and behaviors. The therapist and the client work collaboratively to change the client's maladaptive thoughts, feelings, and behaviors in order to adopt more adaptive and rational thoughts, feelings, and behaviors (Duckworth & Freedman, 2012). In addition, CBT techniques such as self-talk and mental visualization can be used to help children with executive function deficits as methods of compensation and remediation (McCloskey et al., 2014). Studies have shown that people with schizophrenia respond better to CBT when they have increased dorsolateral prefrontal cortex activity (Kumari et al., 2009). As previously discussed, the DLPFC contributes to many different executive functions skills, including sustained attention and cognitive set shifting. The link between CBT and executive functions also indicates that the use of CBT can improve executive functions deficits. This is particularly true for adolescents and adults experiencing anxiety, depression, symptoms of obsessive compulsive disorder (OCD), symptoms of ADHD, and symptoms of post trauma anxiety (Bannon, Gonsalvez, Croft, & Boyce, 2006; DePrince & Shirk, 2013; Mohlman & Gorman, 2005; Ramsay, 2010). CBT can be a useful counseling tool in helping students with executive functions deficits.

Specific manual-based programs have also been developed to target executive functions. Although some do not specifically mention executive functions, the programs target skills and self-regulation capacities that are important to students' social and behavioral development. One of these programs, called I Can Problem Solve (Shure, 2001), helps children learn how to resolve interpersonal problems and prevent antisocial behaviors. It is an evidence-based program that has been shown to help students in grades

preschool through fifth grade decrease negative behaviors (e.g. impulsive behaviors) and increase prosocial behaviors (Feis & Simons, 1985; Shure, 1980). Another program designed to increase students' executive functions without necessarily using the technical vocabulary is SuperFlex: A Superhero Social Thinking Curriculum (Madrigal & Garcia Winner, 2008). This program uses superheroes and villains ("Unthinkables") to teach children about flexible thinking and understanding the wants and needs of others. For example, in one lesson of the curriculum, students learn how to overcome "rock brain" (rigid thinking) in order to be more flexible and consider other ways of doing things. This is directly related to the flexible/shift self-regulation capacity in the McCloskey model of executive functions (McCloskey et al., 2009). Although not much research has been completed about the efficacy of the SuperFlex curriculum, recent studies have demonstrated its effectiveness in increasing prosocial behaviors and decreasing negative behaviors in students with autism and ADHD (Bolton, 2010; Rieman Yadlotsky, 2012). Other manual-based programs include The Zones of Regulation (Kuypers, 2011), Brain Lock (Schwartz & Beyette, 1997), and Treating Explosive Kids: A Collaborative Problem Solving Approach (Greene & Ablon, 2006).

Due to the growth of technology, some programs are more computer-based and use neurological research to improve working memory and other executive functions in game-like activities. One popular computer-based program is Cogmed Working Memory Training (CWMT) (Pearson Education, 2014), a software program that provides cognitive games and exercises aimed at improving working memory. Randomized clinical trials have noted gains in certain aspects of working memory in children with ADHD, as well as increases in attention in daily life, for people with and without ADHD

(Chacko et al., 2014; Spencer-Smith & Klingberg, 2015). However, other studies have demonstrated that there is little to no evidence that increases in attention and working memory on the CWMT generalize to real-life situations (Hulme & Melby-Lervag, 2012; Shipstead, Hicks, & Engle, 2012). As technology moves forward and becomes a larger part of the educational experience in schools, more research will be conducted about the potential uses of programs likes CWMT.

Modeling/teaching specific skills. Although similar to manual-based counseling programs and curriculums, another way to promote the internalization of executive functions is to model the specific skills and directly teach the skills. Social modeling is an effective way to help children engage in executive function skills by showing students how to self-direct and self-regulate in real-world situations (McCloskey et al., 2009). For example, if a student struggles with task initiation, a teacher may walk through the steps to begin a task, including gathering required materials, reading the directions, and starting the task with the first step. Dawson and Guare (2012) also describe a modeling intervention in which students with executive deficits are coached through the goal-setting and achieving process by a trained individual in the school setting. This coaching intervention involves daily meetings, goal-directed persistence, and progress monitoring.

Directly teaching executive functions involves cognitive strategy training in which tasks are dismantled into step-by-step pieces so that students are able to complete the entire task with self-direction cues and scaffolding (McCloskey et al., 2009). The goal is for the task to become a routine so that the students are able to complete it independently. Dawson and Guare, 2009 explore several steps in teaching executive function skills: identifying the problem behavior, setting a goal, outlining the steps

needed to reach the goal, turning the steps into a skill routine, supervising the child following the routine, and fading the supervision. An example of one skill routine might be "getting ready to begin the day," which focuses on task initiation, sustained attention, and working memory (Dawson & Guare, 2010). In this routine, the teacher and student create a list of tasks that need to be completed before the class comes to order. This becomes a checklist that the student uses on a daily basis in order to complete all morning activities. Other routines might include "end-of-day routine," "desk cleaning routine", "studying for tests," and "long-term projects" (Dawson & Guare, 2010). When teaching routines, it is important to be specific about the steps needed to complete the activity, and, as with all interventions, the effectiveness of the routine should be monitored regularly.

Strategies for developing internal control. As previously mentioned, the goal for interventions with any cognitive and/or academic skills is for the student to internalize the strategy being taught and then be able to use it or generalize it to other situations on his/her own. With executive functions, the goal is for the student to internalize directive capacities and develop internal control (McCloskey et al., 2009). There are many different strategies to assist in the development of internal control; however, it is important to note that many of these interventions are initially external control strategies and bridging strategies. As the student practices the interventions and internalizes the concepts, they become mechanisms of internal control and independent usage.

Once children have learned and practiced self-talk and other internal feedback strategies, they can begin to use mental imagery to help engage executive function capacities and know when to access higher order executive function processes that may

be developing (McCloskey et al., 2014). Over time, students may develop scripts or routine self-statements that they use to verbalize a goal, engage a learned strategy, and/or promote a positive response (Dawson & Guare, 2010). In addition, after experiencing and internalizing external rewards and consequences from behavior plans or charts, children may be able to self-administer rewards for complying with external demands (McCloskey et al., 2014). Self-monitoring is also an internal strategy that can be used by students to cue themselves to engage in executive functions (McCloskey et al. , 2014). As previously mentioned, external forces are initially used as the cue; however, students can also develop their own internal cues to effectively engage executive capacities. A recent review of the literature from 1988 to 2008 determined that self-management or monitoring is an effective way for students to change their behavior in the classroom (Briesch & Chafouleas, 2009). Although success varied based on the techniques used to teach self-management, these results are promising for the use of self-monitoring strategies to improve executive functions in the school setting.

Strategies for academic production. As previously noted, executive functions deficits are commonly comorbid with learning disabilities. Furthermore, deficits in executive functions cause problems with academic skill production, sometimes called producing disabilities (Denckla, 2007; McCloskey et al., 2009). Although these will be explored in more depth later in this discussion, producing disabilities occur when students are able to adequately learn or retain the material, but are unable to produce adequate academic output. For example, a student may study for a science test and know the required material when reviewing at home. However, at the time of the test, the student may have difficulty conveying ideas on paper. Many of the interventions

(external control, bridging, and internal control) previously described can be applied to academic skill production (McCloskey et al., 2014). However, executive functions interventions that are specific to academic output are also important in the school setting.

Reading. For students struggling with reading fluency, the difficulties may arise from poor use of the pace cue (McCloskey et al., 2014). These students may need external cues to help them with the appropriate pace and speed of reading. Therefore, strategies that employ guided reading, paired reading, repeated reading, preview of unfamiliar material, and the neural impress method may be effective in setting the word reading rate for these students (Kaufman, 2010; McCloskey et al., 2014). If students are having difficulty with basic reading skills (word reading and/or decoding), research supports the use of systematic, multi-sensory phonics instruction (Kaufman, 2010; National Institute of Child Health and Human Development, 2000). In particular, programs like Letterland (Letterland International, 2014) appear to be best suited for children with executive dysfunctions, as they include kinesthetic components, making them more explicit and less susceptible to inattention.

Because reading comprehension is a complex process, the interventions for reading comprehension with students who have executive deficits can be complicated. However, these interventions can be organized into strategies used before reading, during reading, and after reading. Before reading, students can preview the material by creating a KWLS chart (what I know, what I want to know, what I learned, and what I still want to know), which can also help them develop a plan for comprehension (Ogle, 1986). Teachers can also preview vocabulary with students and encourage the use of “book walks,” looking through the book or article and pointing out the important information

(Kaufman, 2010). During reading, there are many different cognitive strategies and self-monitoring routines that can be taught to help students become active readers (Kaufman; 2010; McCloskey et al., 2014). One of these strategies involves comprehension process motions (CPMs), which were designed to make comprehension processes more accessible and help teachers know which students understand the material and which students do not (Block, Parris, & Whiteley, 2008). Another strategy involves coding text by placing student thoughts into the material with a series of symbols (Harvey & Goudvis, 2007). After reading, students with executive deficits may benefit from using reading response logs, summarizing the material into post reading reviews, and/or role playing the sequence of events (Kaufman, 2010).

Written expression. Written expression can be especially difficult for students with executive deficits, due to the integration of motor processes and cognitive process in the production of written material. Therefore, the first skill needed for written expression is handwriting. Many programs are available to help children automate the handwriting process by making them consciously aware of the motor movements needed to form each letter. One of the more successful handwriting programs is Handwriting Without Tears (Olsen, 2013). This program uses multi-sensory approaches to help students understand the handwriting process. The next step in the writing process is prewriting. This can include thought gathering, planning, and organizing the material into a sequential sentence, paragraph, or essay. Some of the more common prewriting strategies include graphic organizers, story maps, and story boards (Kaufman, 2010). Graphic organizers can also be used to help with the actual writing stage of the process by visually planning out the sequence of the paragraphs. Once the work has been planned and written, the next

step in the writing process is editing. There are many acronym-driven editing strategies to help students remember what to look for while rereading their work. These include COPS (Ellis & Lenz, 1987), SCOPE (Bos & Vaughn, 1988), and COLA (Singer & Bashir, 2004). However, there are some programs and routines that assist students in all stages of the writing process, including planning, generating, and editing text. One such system is called self-regulated strategy development (SRSD) (Graham & Harris, 2005). This approach offers a series of scaffolded strategies to guide students through the writing process from planning to editing. It also focuses on generalization of strategies so that students can make the writing process more independent.

Mathematics. Math production can also be a difficult for students with executive functions difficulties, due to the sequential and multistep nature of many math procedures. This may be particularly true for students with deficits in retrieve, execute, and correct self-regulation capacities. Strategies to improve math production often include minimizing the number of algorithms taught, scaffolding the algorithm selection process, embedding algorithms into worksheets, lessening working memory demands by providing math facts, and/or self-talk (Kaufman, 2010). However, there are approaches that focus on cognitive strategy routines similar to those for written expression. One such approach is a direct-instruction model called Connecting Math Concepts, which focuses on the application of math problem solving skills (Engelmann, Carnine, & Kelly, 1996). Research on schema-based, direct-instruction math programs has found them to be successful in improving and maintaining math problem solving skills (Jitendra & Hoff, 1996; Xin, Jitendra, & Deatline-Buchman, 2005). In fact, programs based on schemas

(conceptual understanding of the problem structure) were found to be more successful than programs based on more general strategies.

Overall, the majority of executive functions interventions focus on transitioning from external control and scaffolding to internal control and self-monitoring. When considering any intervention, it is important that school psychologists use only evidence-based strategies, theories, and programs in their practice. Before using any program or intervention, school psychologists should review the available research and determine the potential benefits and harms for utilization in their practice.

The Importance of Executive Functions Assessment and Intervention

Once the best practices in executive functions assessment and intervention are explored and understood, it is important to discuss the relevance of these executive functions practices in psychoeducational evaluations. Due to increases in the number of children with medical conditions that affect school performance, the use of pediatric medications, and the number of educational/behavioral challenges in schools, it has become more important for school psychologists to complete school neuropsychological assessments, including measures of executive functions development (Cleary & Scott, 2011; Decker, 2008; Miller, 2013; Schmitt & Wodrich, 2008). Executive functions are implicated in many of the most common clinical and education diagnoses for children and are part of a comprehensive, intervention-focused evaluation process that is both required by law and highly recommended by the National Association of School Psychologists (NASP, 2009). The following is a brief discussion of these factors that highlights the importance of executive functions measurement and intervention in psychoeducational evaluations.

Clinical diagnoses and educational disabilities. According to estimates by the Centers for Disease Control and Prevention (CDC), about 1 in 88 children is diagnosed with an autism spectrum disorder (ASD), and about 1 in 10 children is diagnosed with attention deficit hyperactivity disorder (ADHD) (CDC, 2010, 2012). The CDC also reports that the prevalence of both of these childhood disorders has been increasing in recent years. Therefore, assessment in executive functioning is extremely important in the school setting, as both ASD and ADHD are characterized by different profiles of executive skill deficits (Happe et al., 2006). Specifically, research suggests that children with ASD have executive function deficits in flexibility, working memory, initiation, organization, planning, response inhibition, and self-monitoring, with some becoming more impaired over time (Robinson, Goddard, Dritschel, Wisley, & Howlin, 2009; Rosenthal et al., 2013). Children with ADHD have been found to have executive deficits in working memory, self-regulation, internalization of speech, behavioral analysis and synthesis, and initiating and sustaining goal plans (Barkley, 1997; Freer, Hayden, Lorch, & Milich, 2011). Considering these profiles, executive functioning assessment is not only important in the identification of ASD and ADHD in school-age children, but also in the differential diagnosis.

Assessment of executive functions is also crucial in psychoeducational evaluations, due to the effects of executive functions on aspects of academic achievement and intelligence, which are both essential in the identification of educational disabilities. Research has shown that executive functions are critical in the development of fluid and crystallized intelligence and in the profiles of children with intellectual disabilities, such as Down and Williams syndromes (Brydges et al., 2012; Carney, Brown, & Henry, 2013;

Rowe et al., 2006). Furthermore, executive functions deficits are highly correlated with deficits in communication, social skills, activities of daily living, and other adaptive behaviors typically found in students with intellectual disabilities, ASD, and other cognitive disorders (Clark, Prior, & Kinsella, 2002; Gilotty, Kenworthy, Sirian, Black, & Wagner, 2002). This connection suggests the importance of evaluating and intervening with executive deficits when working with students identified with intellectual disability, autism, and other educational disabilities involving adaptive behavior difficulties.

Executive functions also contribute to the development of many academic skills, including mathematics, written expression, reading comprehension, and overall academic achievement (Best et al., 2011; Clark, Pritchard, & Woodward, 2010; Hooper, Schwartz, Wakely, de Kruif, & Montgomery, 2002; Sesma, Mahone, Levine, Eason, & Cutting, 2009). Deficits in cognitive set shifting, attention, and focus are associated with difficulties in reading fluency and comprehension (Kaufman, 2010). In writing, children may have high output production failures, due to executive function weaknesses affecting cognitive and motor outputs (Hale & Fiorello, 2004; Levine, 2003). In math, the brain's executive system is required in order to select problem solving strategies, execute calculations, perceive operations, and sequences procedures (Kaufman, 2010; McCloskey et al., 2014). Executive function skills have also been associated in the overall adjustment of middle school students and in the identification of learning disabilities (Jacobson, Williford, & Pianta, 2011; Peng, Congying, Beilei, & Sha, 2012; Reiter, Tucha, & Lange, 2004). Therefore, if school psychologists want to fully understand and intervene with the academic skill weaknesses of their students, comprehensive assessments and interventions in executive functions are needed.

Assessment of neuropsychological constructs, such as working memory, attention, and executive functions, becomes even more important when assessing students with learning disabilities who are not responding to interventions (Semrud-Clikeman, 2005). This is due to the potential for students to have comorbid conditions and for students to have producing difficulties in addition to learning disabilities. As previously discussed, ADHD-LD comorbidity is at an all-time high, with a mean of 45.1% in the most recent review of literature (DuPaul et al., 2013). This means that ADHD is present in almost half of the population of students identified with learning disabilities. In order to explain this relationship, research has demonstrated that the worse executive functions deficits are for a child with ADHD, the more likely it is that child has a comorbid learning disability (Mattison & Dickerson Mayes, 2010). In other words, increased executive functions deficits in children with ADHD also increase the likelihood that those children have an accompanying learning disability. This research supports the routine assessment of executive functions in the evaluation of students with ADHD and/or learning disabilities.

In addition, many students experience difficulties in school despite having acquired academic skills and being able to learn new material. These students may be experiencing producing disabilities, as opposed to learning disabilities (Denckla, 2007). In producing disabilities, students have difficulty with producing work and complying with the demands for production. For example, a student may be able to formulate an essay response in his/her head, but then struggle with recording those thoughts in writing for a test. Because these students often demonstrate adequate basic cognitive abilities and academic achievement in standardized assessments, they typically are not eligible for

special education services (McCloskey et al., 2009). However, these students often experience persistent failure in school and are in need of comprehensive evaluation and treatment planning. Instead of being considered developmentally delayed, such as students with learning disabilities and learning disabilities/producing disabilities combined, students with producing difficulties are usually described as having negative character traits like laziness and lack of responsibility (McCloskey et al., 2009).

The assessment of executive functions is also considered a vital part of comprehensive, school neuropsychological reports. In the current Cattell-Horn-Carroll/School Neuropsychology integrated model, executive functions are included as one of the four broad cognitive functions to be assessed (Miller, 2013). As part of this model, executive functions are considered indicative of a constellation of behavioral difficulties included in many childhood disorders, such as anxiety, ADHD, bipolar disorder, emotional disturbance, and depression. Executive functions are also considered important in the retrieval of verbal information, which is essential for accurate and successful reading (Miller, 2013).

In many other models, executive functions are also recommended in the assessment of reading, written language, and math disorders when conducting evaluations to identify specific learning disabilities (SLD) (Feifer, 2013; Flanagan, Ortiz, & Alfonso, 2013). IDEA 2004 now recognizes the use of other alternative research-based procedures for determining whether a child has a specific learning disability, making the use of these models legal and more common. In the dual discrepancy-consistency model of SLD identification, executive functions, specifically working memory, are indicated as an important area of assessment in order to prescribe individualized and effective

interventions (Flanagan et al., 2013). Executive functions are also considered important to reading comprehension and written language deficits in the cognitive hypothesis model (CHT) of assessment (Hale & Fiorello, 2004). Due to the evidence of frontal lobe dysfunction in both reading and written language disorders, it is recommended that executive function skills be included in evaluations in order to determine the nature of a child's disorder.

Therefore, because executive functions are implicated in most clinical and educational disorders for children, they are included in many models of school neuropsychology, and encompass their own area of disability, it is essential that psychoeducational evaluations include the assessment of and intervention in executive skills.

Regulations, law, and changes in the field. Due to their involvement in most childhood disorders and disabilities, the assessment of executive functions is also indirectly required by special education law. The Individuals with Disabilities Education Act (IDEA) of 2004 is a law that protects the rights of all children to a free and appropriate education in the least restrictive environment. Within this law is the provision that children referred for special education services receive a comprehensive evaluation in all suspected areas of disability (IDEA, 2004). This suggests that if executive functions are implicated in most educational disabilities, then they should be included in the psychoeducational evaluation. In recent case law, the assessment of cognitive processes, such as attention, memory, and executive skills, was supported in the Supreme Court ruling of *Forest Grove School District v. T.A. 557 U.S. 230 (2009)* (Dixon et al., 2011). In this case, the court found the school district liable partially due to the inadequacy of a psychoeducational evaluation in assessing all areas of the student's possible disability. In

a redacted due process case, Rock and Bateman (2009) also present a ruling in which the school district was found liable due to an evaluation that lacked assessment in all areas of possible disability. The school district also failed to consider nonacademic instruction, such as social skills and study skills in the need for specially designed instruction. Considering this information, there appears to be a legal precedent in the inclusion of additional cognitive abilities, including executive functions, in psychoeducational evaluations and interventions.

In addition to legal support for the assessment of executive functions, the National Association of School Psychologists has called for a shift in the field of school psychology towards more intervention-focused and public health oriented assessment practices (Castillo, Curtis, & Gelley, 2012). Although NASP supports the use of response to intervention (RtI) as the primary mode for increased focus on interventions, there has been a historical push for the inclusion of neuropsychology within the field of school psychology (D'Amato, 1990; Gaddes, 1980; Hynd, 1980). In addition, researchers have developed a system of neuropsychologically based RtI (NB-RtI) that provides screening of cognitive processes (including executive functions) that underlie academic concerns in order to help educators understand why a student is having difficulty and choose effective interventions to remediate concerns (Witsken, Stoeckel, & D'Amato, 2008). This demonstrates that comprehensive psychoeducational evaluations, with inclusion of executive functions assessments, can lead to more effective remediation for students.

As previously discussed, executive functions are included in many models of school neuropsychological assessment in order to determine the nature of a child's disorder(s) (Flanagan et al., 2013; Hale & Fiorello, 2006; Miller, 2013). By finding the nature of the

deficits, the clinician is better able to recommend individualized and effective interventions. For example, when assessing a child for reading concerns, it is important to determine the possible reading disorder subtype (e.g. dysphonetic dyslexia, surface dyslexia, mixed dyslexia, or comprehension deficits) (Feifer, 2013). Executive functions and working memory are important to the organization of information and the learning of new information, which are essential to reading comprehension. If a child is demonstrating executive skill deficits related to a reading comprehension disorder, then the clinician can recommend reading programs or strategies specific to improving executive functions (Feifer, 2013). In this example, the clinician may recommend a program such as Soar to Success (Houghton Mifflin Harcourt, 2008), which assists children in self-organizing information, rather than the WILSON Reading System (Wilson Language Training Corp, 2010), which focuses on phonological awareness and processing. By including executive functions in a psychoeducational evaluation, the clinician is better able to recommend interventions that will address the specific needs of the child.

Current practices. Although there is a definite need for comprehensive evaluations and intervention plans including executive functions, there appears to be a discrepancy between this need and current practices in the field of school psychology. In studies involving regular education teachers' and administrators' perceptions of school psychologists, teachers and administrators reported misconceptions about school psychological services. For example, regular education teachers reported that school counselors provide more services than school psychologists and that school psychological services are not helpful to teachers (Gilman & Medway, 2007). In addition, teachers and

administrators reported that school psychologists should engage in more psychoeducational assessment activities (Gilman & Gabriel, 2004). Although these studies are not specific to school psychologists' assessment of and intervention in executive functions, they do illustrate the misperceptions about school psychological practice in general.

Although no formal research has been conducted about school psychologists' assessment and intervention practices specific to executive functions, information from studies of school psychologists' related assessment practices suggests that they may not be appropriately assessing executive skills. For example, in a national survey of school psychologists' assessment practices in the identification of ADHD, less than 4% of the respondents said that they frequently use direct measures of executive functions, such as the Trail Making Test, the Wisconsin Card Sorting Task, and Conners' Continuous Performance Task (CPT) (Koonce, 2007). As previously discussed, direct measures of neuropsychological processes are essential to comprehensive evaluations of executive functions deficits, including ADHD. Another study conducted about the ADHD assessment practices of psychologists found that only 15% of the participants used best practices when completing assessments for ADHD. Among the school psychologists who participated in the study, only 23% reported using best practices, including a multi method evaluation, when assessing for ADHD (Handler & DuPaul, 2005).

In research using responses from 207 NASP members from around the country, most participants indicated that they rarely or never use neuropsychological measures as part of their psychoeducational assessments (Slonaker & Pass, 2011). Furthermore, McCloskey and Perkins (2012) note that in a compendium of comprehensive evaluation

reports for children with a variety of disabilities, including ADHD, ASD, and other neurocognitive disorders (Mather & Jaffe, 2010), approximately 19% of the presented reports included assessments specific to executive functions. Only around 9% of the presented reports included recommendations for interventions that were specific to executive functions. These findings suggest that school psychologists are not including the assessment of executive functions in their evaluation routines in proportion to the number of students who are thought to have executive functions deficits.

This research suggests that school psychologists may not be adequately assessing processes such as executive functions when working with students who are at risk for these deficits. This has led some school psychologists to embrace the emerging field of school neuropsychology (Miller 2013; Schmitt & Wodrich, 2008). School neuropsychology is briefly defined as the integration of neuropsychological and educational principles into the assessment of and intervention for children and adolescents (Miller 2013). In this emerging field, emphasis is placed on the inclusion of executive functions and other neuropsychological processes when assessing and intervening in the school setting. With the increased number of children with medical conditions that affect school performance, the increased use of medications given to children, the increased incidence of educational and behavioral problems in children, and the increased emphasis on the identification of processing disorders within learning disabilities, there is a growing interest in school neuropsychology (Cleary & Scott, 2011; Decker, 2008; Miller, 2013; Schmitt & Wodrich, 2008).

Overall, the assessment of and intervention in executive functions are crucial in the completion of psychoeducational evaluations and provision of special education services

in the school setting. Best practices in executive functions support the use of varied assessment strategies and tools, with inclusion of varied settings, informants, and sessions, when appropriate. In general, a comprehensive evaluation of executive functions should include case history, parent/teacher and student interviews, behavior rating scales, classroom observations, and formal, direct neuropsychological measures. Executive functions assessment is essential in the schools due to the implication of executive skills in many childhood disabilities and the responsibility of schools to offer children comprehensive evaluations in all areas of possible disability. In addition, with increased focused on the delivery of effective interventions to children in schools, the assessment of executive functions is an important factor in identifying those interventions. Evidence-based interventions focused on students' executive function deficits can change maladaptive behaviors and optimize brain functioning. Best practices in executive functions interventions include strategies of external control, bridging, and internal control with focus on getting students to internalize and independently use learned strategies.

Research Questions

The current study was designed to explore school psychologists' perceptions, competency, and practices with regard to executive functions. The main purpose was to address school psychologists' frequency and competency in the assessment of and intervention in executive functions. Possible reasons for school psychologists' frequency and competency in executive functions assessment and intervention are also explored. Because previous research of this kind has not been completed for executive functions, no reliable hypotheses can be developed. However, the following are a series of research

questions aimed at exploring the executive functions assessment and intervention practices of school psychologists.

1. **Perceptions.** How do school psychologists perceive executive functions?

    1a. What mental abilities or capacities do school psychologists believe to be most important in psychoeducation evaluations?

    1b. Do school psychologists rate executive functions as relevant in their psychoeducational evaluations?

2. **Competency.** How competent and knowledgeable are school psychologists about executive functions?

    2a. How do school psychologists define the construct of executive functions and their relation to overall intellectual functioning?

    2b. Which disabilities and special education categories do school psychologists associate with deficits in executive functions?

    2c. Which cognitive capacities do school psychologists consider executive functions?

    2d. How competent do school psychologists rate themselves in the assessment of and intervention in executive functions?

    2e. In what ways do school psychologists receive training in the area of executive functions?

3. **Frequency of assessment.** How often do school psychologists assess executive functions?

    3a. How often do school psychologists include assessments of executive functions in their psychoeducational evaluations?

3b. For which special education disability categories do school psychologists assess executive functions?

3c. Which measures of executive functions do school psychologists include in their psychoeducational evaluations?

4. Frequency of intervention. How often do school psychologists recommend interventions for executive functions?

4a. How often do school psychologists include recommendations to remediate executive function deficits in their psychoeducational evaluations?

4b. For which special education disability categories do school psychologists recommend executive function interventions?

4c. Which interventions for executive function deficits do school psychologists recommend in their psychoeducational evaluations?

5. Application. How do school psychologists apply knowledge about executive functions to real-world situations?

5a. Which assessment procedures do school psychologists identify as important for students demonstrating deficits in executive functions?

5b. Which levels of regular education and special education services do school psychologists recommend for students demonstrating deficits in executive functions?

5c. Which interventions and strategies do school psychologists recommend for students with executive function deficits?

6. Comparison. How do school psychologists compare in the frequency of executive functions assessment and intervention?

6a. Do Nationally Certified School Psychologists (NCSPs) assess executive functions and/or recommend executive functions interventions more often than non-NCSPs?

6b. Do school psychologists with more years of experience assess executive functions and/or recommend executive functions interventions more often than school psychologists with fewer years of experience?

6c. Do school psychologists with higher levels of education assess executive functions and/or recommend executive functions interventions more often than school psychologists with lower levels of education?

6d. Do school psychologists who practice in certain states assess executive functions and/or recommend executive functions interventions more often than school psychologists who practice in other states?

Chapter 3: Method

This chapter describes the methods that were used to conduct this study. The objective of the study was to investigate school psychologists' knowledge, competency, and frequency of executive functions assessment and interventions. Additional objectives included investigation of possible reasons why school psychologists do not assess for or intervene in executive functions, analysis of demographic data in relation to differences in executive functions assessment and intervention, and exploration of how school psychologists apply knowledge of executive functions to real-life case studies.

Participants

Participants included currently practicing school psychologists and school psychologists in training who were completing their internships for the Educational Specialist (Ed.S.) certification (or an equivalent degree). Participants reported working primarily in Massachusetts, Ohio, Delaware, New Jersey, Pennsylvania, and New York. All school psychologists participating in this study agreed to complete a survey about their knowledge of and competency in assessing cognitive processes related to learning and behavior. More detailed information about the participants is included in Chapter 4.

Data Source

The instrumentation in this study included a survey created by the author in order to gather information about school psychologists' frequency and competency of assessment of and intervention in executive functions deficits. Survey data was used because it can provide analyzable quantitative information (American Statistical Association, 1998). The survey also asked for basic demographic information, including number of years of service as a school psychologist, gender, race/ethnicity, level of training, and highest

degree attained. In order to ensure the face validity of the survey, three members of the dissertation committee, including two staff members at the Philadelphia College of Osteopathic Medicine (PCOM), reviewed the questions. The survey contained questions in multiple choice, Likert scale, and short-answer formats. Several questions were based on brief case studies intended to gauge competency in the assessment of and intervention in executive functions deficits. Several inclusion criteria questions were positioned at the beginning of the survey to ensure eligibility for participation in the study.

The survey was titled Assessment and Intervention of Cognitive Processes Survey: Practicing School Psychologists, and was organized into two main sections. The first section asked questions related to the frequency and competency of executive functions assessment and recommendation of interventions, as well as the demographic data. Participants were alerted at the end of Section 1 that they could discontinue participation at that time. Section 2 included vignettes or case studies aimed at measuring the application of school psychologists' knowledge of and competency in assessing executive functions in real-life contexts.

The survey was further divided into six subsections to address the six areas of inquiry. The first section of the survey was designed to explore which cognitive processes and capacities school psychologists believe to be most essential in their psychoeducational evaluations. The second subsection of the survey explored school psychologists' knowledge of executive functions and the related issues in special education. Participants were asked to respond to statements using Likert scale answers. This subsection also included questions about level of training in executive functions. The purpose of the third subsection of the survey was to evaluate school psychologists' frequency of executive

functions assessment and determine which assessments are used most frequently. Similarly, the fourth section of the survey evaluated school psychologists' frequency of making executive functions intervention recommendations and which interventions are recommended most frequently.

Subsection five included questions about participant demographics, including gender, ethnicity, years of service, highest degree attained, licensure status, certification status, and state in which they practice. Information in this section was be used to determine any differences in executive functions assessment or intervention practices based on demographic variables. Subsection six included three vignettes or brief case studies describing students experiencing executive functions deficits. These vignettes were adapted from executive functions profiles/case studies presented in the work of McCloskey, Perkins, and Van Divner (2009). The vignettes were categorized into three different subtypes of executive function deficits: the "lazy" subtype, the "inattentive" subtype, and the "externalizing/internalizing" subtype (McCloskey et al., 2009). The participants were asked to respond to a series of questions based on the information provided in the vignettes. The purpose of these activities was to investigate school psychologists' executive functions assessment and intervention practices when encountering real-world situations. For a copy of the survey used in this research, please see Appendix A.

Procedure

After review of the survey by the doctoral committee, the study was submitted to the PCOM Institutional Review Board (IRB) for approval. Once approved, the survey was converted into an electronic format using a paid subscription with SurveyMonkey

(www.surveymonkey.com). The link to the survey (and accompanying explanation of the study) was presented to representatives from the Association of School Psychologists in Pennsylvania (ASPP), the New Jersey Association of School Psychologists (NJASP), the Massachusetts School Psychologists Association (MSPA), the Ohio School Psychologists Association (OSPA), the Connecticut Association of School Psychologists (CASP), the New York Association of School Psychologists (NYASP), the Delaware Association of School Psychologists, the Maryland School Psychologists' Association, and the Philadelphia College of Osteopathic Medicine (PCOM) psychology department through e-mail for dissemination to members of each organization. The survey was also distributed by e-mail to a convenience sample of school psychologists through personal contacts. Included with the link to the survey was a cover letter that described the purpose of the study, an approximate time for completion of the survey (about 30 minutes), and an invitation to participate in the study (see Appendix B). The invitation provided information about the voluntary nature of participation and the anonymous and confidential nature of the study, because there were no questions requiring identifying information and survey submission was not tracked.

After the initial e-mail, additional reminder e-mails were sent 2 weeks and 1 month after the initial invitation date. As a possible incentive for participating in the study, participants were offered the opportunity to enter their e-mail address for a chance to win a $20 gift card to Amazon. The link directed participants to another screen where they provided this information. Therefore, survey information was not linked to raffle submission.

Analyses

To examine research questions, descriptive and inferential statistics were computed using the Statistical Package for the Social Sciences (SPSS). The data is presented in frequency tables, with descriptive statistics calculated for each research question. In addition, independent samples *t* test and one-way analysis of variance (ANOVA) were used to analyze the relationships between demographic variables and school psychologists' frequency of executive functions assessment, frequency of recommendations for executive functions interventions, and overall knowledge of executive functions.

Chapter 4: Results

This chapter presents the data analyses of survey responses of participating school psychologists. Demographic information about the sample is presented. Data analyses of the survey of school psychologists' perceptions, competency, frequency, and application of executive functions are examined and presented. Additionally, data comparing school psychologists' frequency of executive functions assessment and recommendation of interventions grouped by demographic characteristics is presented.

Demographics

Participants in this study were 167 school psychologists and school psychology interns primarily from Massachusetts, New Jersey, New York, Ohio, and Pennsylvania. Although there were 266 total responses, 99 were removed from the sample data due to incomplete responses (not including those participants who chose not to participate in Section 2 of the survey). Participants were mainly practicing school psychologists (n = 146) rather than school psychology interns (n = 21). In addition, participants were mostly female (n = 145) rather than male (n = 21). One participant chose not to disclose his/her gender. Most of the participants considered themselves Caucasian (n = 159). Table 1 present the demographics.

Table 1

Demographics

	n	%
Practicing school psychologist	146	87.4
School psychology intern	21	12.6
Gender		
Female	145	86.8
Male	21	12.6
Ethnicity		
Caucasian	159	95.2
Biracial/Multiracial	3	1.8
African American	2	1.2
Hispanic/Latino	1	0.6
Pacific Islander	1	0.6
Middle Eastern	1	0.6
Age		
20 to 29 years	58	34.7
30 to 39 years	50	29.9
40 to 49 years	25	15.0
50 to 59 years	21	12.6
60+ years	11	6.6
Highest degree attained		
Education specialist	83	49.7

	n	%
Master's +	41	24.6
Doctorate	29	17.4
Master's	11	6.6
Years of practice		
0-5 years	87	52.1
6-10 years	29	17.4
11-15 years	23	13.8
16-20 years	13	7.8
21+ years	15	9.0
NCSP		
Yes	91	54.5
No	75	44.9
Location of current practice		
Massachusetts	37	22.2
New Jersey	34	20.4
New York	33	19.8
Ohio	25	15.0
Pennsylvania	21	12.6
Delaware	8	4.8
Hours of training		
0 to 5 hours	103	61.7
6 to 10 hours	20	12.0

	n	%
11 to 15 hours	5	3.0
16 to 20 hours	9	5.4
21+ hours	30	18.0

Results of Statistical Analysis by Research Question

The following section reviews statistical analyses completed for each research question. Main research questions are not stated because no statistical analyses were completed for these more general areas of inquiry.

1a. What mental abilities or capacities do school psychologists believe to be most important in psychoeducation evaluations? In an open-ended question, participants were asked to list the top five cognitive abilities they believed to be most important when evaluating a student with an academic problem. An analysis of participant responses identified 14 cognitive abilities mentioned by one or more participants. Table 2 shows the general categories into which responses were sorted and the number of participants that mentioned this ability as their most important response.

Table 2

Cognitive Abilities School Psychologists Believe to Be Most Important in Evaluations

Cognitive ability/capacity	*n*	%
Verbal comprehension/reasoning	75	47.2
Verbal and nonverbal reasoning	18	11.3
Working memory	15	9.4
Fluid reasoning	11	6.9
Overall/general intelligence	10	6.3
Language	8	5.0
Executive functions	7	4.4
Crystallized intelligence	5	3.1
Attention	3	1.9
Processing speed	2	1.3
Visual spatial	2	1.3
Memory	1	0.6
Academic	1	0.6
Sensorimotor	1	0.6

1b. Do school psychologists rate executive functions as relevant in their psychoeducational evaluations? In a rank order question, participants were asked to rank the relevance of nine different cognitive abilities from *most relevant* to *least relevant* when completing an evaluation for a child with an academic problem. Cognitive abilities were: reasoning (verbal and/or nonverbal and/or quantitative), visual-spatial,

crystallized knowledge stores, processing speed, immediate/working memory, attention, executive functions, language, and retrieval from long-term storage. Table 3 shows the frequency of rankings for each cognitive ability. Most participants (n = 98) ranked reasoning as the most relevant cognitive ability for an academic evaluation. Only 7.9% of participants (n = 13) ranked executive functions as the most relevant cognitive ability for an academic evaluation. Further analysis reveals that 84 participants (51.2%) ranked executive functions between 1 and 5 and 80 participants (48.7%) ranked executive functions between 6 and 9.

Table 3

School Psychologists' Ratings of Relevancy for Cognitive Abilities in Evaluations

Cognitive Ability	1	2	3	4	5	6	7	8	9
	%	%	%	%	%	%	%	%	%
Reasoning	59.8	16.8	7.3	5.5	1.2	4.3	2.4	1.8	0.6
Visual-spatial	0.6	11.6	13.4	8.5	9.8	12.8	11.0	15.9	16.5
Crystallized knowledge	8.5	13.4	9.8	11.0	6.7	12.8	9.8	13.4	14.6
Processing speed	0.6	4.9	7.9	12.8	17.7	15.9	14.6	7.9	17.7
Memory	7.9	17.1	18.9	20.1	16.5	8.5	6.1	3.7	1.2
Attention	2.4	6.7	11.0	12.2	16.5	16.5	17.1	9.8	7.9
Executive functions	7.9	7.3	15.2	9.8	11.0	9.1	15.2	18.9	5.5
Language	11.6	19.5	11.0	9.1	11.0	7.3	11.0	10.4	9.1
Long-term retrieval	0.6	2.4	5.5	11.0	9.8	12.8	12.8	18.3	26.8

2a. How do school psychologists define the construct of executive functions and their relation to overall intellectual functioning? In structured, Likert format responses, participants were asked to answer questions related to the definition of executive functions. Table 4 presents the participants' endorsements for each question. The most participants chose *disagree* when asked if executive functions are measured on traditional tests of cognitive ability (n = 70). Similarly, the largest group of participants chose *disagree* when asked if executive functions are considered part of the general intelligence factor (g) (n = 63). The most participants chose *agree* when presented with a common, accepted definition of executive functions (n = 86). The largest group of participants chose *disagree* when presented with a widely believed myth that executive functions are a unitary trait (n = 62).

Table 4

School Psychologists' Ratings for Statements Related to Executive Functions in Relation to Overall Intellectual Functioning

"Executive functions are..."	Strongly Agree		Agree		Neut.		Disagree		Strongly Disagree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Measured using tests of intelligence	6	3.6	43	25.7	40	24.0	70	41.9	8	4.8
Considered part of the general intelligence factor (*g*)	9	5.4	54	32.3	29	17.4	63	37.7	12	7.2
Multidimensional capacities that cue our thoughts, feelings, perceptions, and actions	64	38.8	86	52.1	7	4.2	7	4.2	1	0.6
A unitary trait and can be conceptualized as the "general executor"	5	3.0	33	19.8	43	25.7	62	37.1	24	14.4

2b. Which disabilities and special education categories do school psychologists associate with deficits in executive functions? In structured, Likert format responses, participants were asked questions related to special education classifications and executive functions. Table 5 presents the participants' endorsements for each question. The largest group of participants chose *agree* when asked if executive function deficits are indicative of learning disabilities ($n = 65$). However, even more participants chose *agree* when asked if executive function deficits are indicative of producing disabilities ($n = 91$). The largest group of participants disagreed when asked if students with

executive function deficits should qualify for special education services under the classification of specific learning disability (*n* = 56), while the largest group of participants chose *neutral* when asked if students with executive function deficits should qualify for special education services under the category of other health impairment (*n* = 54). The most participants chose *disagree* when asked if all children with executive function deficits have ADHD (*n* = 86).

Table 5

School Psychologists' Ratings for Statements Related to Disabilities and Special Education Categories Associated With Executive Function Deficits

	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Deficits are indicative of learning disabilities	12	7.3	65	39.4	38	24.0	49	29.7	1	0.6
Deficits are indicative of producing disabilities	24	14.4	91	54.5	37	22.2	14	8.4	1	0.6
Children with deficits should qualify for specific learning disability	14	8.4	43	25.9	46	27.7	56	33.7	7	4.2
Children with deficits should qualify for other health impairment	14	8.4	51	30.5	54	32.3	42	25.1	6	3.6
All children with deficits have ADHD	1	0.6	4	2.4	14	8.4	86	51.5	62	37.1

2c. Which cognitive capacities do school psychologists consider executive functions? When presented with structured, Likert-format questions, participants were asked to indicate which cognitive capacities they considered to be executive functions. Table 6 represents participants' endorsements to questions about categorization of cognitive capacities. The largest groups of participants agreed that working memory (*n* = 88), task initiation (*n* = 79), processing speed (*n* = 66), and cognitive flexibility (*n* = 81) are considered executive functions.

Table 6

School Psychologists' Categorization of Cognitive Capacities as Executive Functions

	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Working memory	51	30.5	88	52.7	13	7.8	15	9.0	0	0.0
Task initiation	70	47.9	79	47.9	5	3.0	2	1.2	0	0.0
Processing speed	17	10.2	66	39.8	31	18.7	47	28.3	5	3.0
Cognitive flexibility	73	43.7	81	48.5	9	5.4	4	2.4	0	0.0

2d. How competent do school psychologists rate themselves in the assessment of and intervention in executive functions? When presented with a structured, Likert format question, participants rated their feelings of competency in the assessment of and intervention in executive functions on a scale from *very competent* to *very incompetent*.

Table 7 shows participants' ratings on this question. Roughly half of the participants in the sample rated themselves as *competent* (*n* = 83).

Table 7

School Psychologists' Ratings of Competency in Executive Functions

Rating	*n*	%
Very Competent	10	6.0
Competent	83	49.7
Neutral	55	32.9
Incompetent	16	9.6
Very Incompetent	3	1.8

2e. In what ways do school psychologists receive training in the area of executive functions? When presented with a checklist of possible responses, participants were asked to indicate which types of training they have received in the area of executive functions. Table 8 presents participants' indicated responses. Most participants reported receiving executive functions training in the form of books/texts/research articles (*n* = 147) and workshops/conferences (*n* = 116).

Table 8

School Psychologists' Indicated Forms of Training in Executive Functions

Type of Training	*n*	%
Books/texts/research articles	147	88.0
Workshop/conference	116	69.5
Graduate course for degree	79	49.4
Online training/webinar	54	32.3
District-based inservice	40	23.9
Manual-based program	21	15.5
Graduate course beyond degree	19	11.4
No formal training	12	7.2
Other	6	3.9

3a. How often do school psychologists include assessments of executive functions in their psychoeducational evaluations? In a structured, Likert format question, participants were asked to rate how often they include the assessment of executive functions in their psychoeducational evaluations. Table 9 shows participants' ratings of frequency of assessment. The largest group of participants reported that they *sometimes* include executive functions assessment in their evaluations (n = 60). In addition, participants who chose *rarely* or *never* on this question were then asked to indicate possible reasons why they do not include executive functions assessments in their evaluations. Table 10 presents the responses for those 30 participants. It is important to note that participants were allowed to choose multiple responses. The majority of

participants indicated limited resources/test kits as the reason for not including executive functions assessment in their psychoeducational evaluations (*n* = 21).

Table 9

School Psychologists' Ratings of Frequency in Assessment of Executive Functions

Rating	*n*	%
Almost always	28	16.9
Often	48	28.9
Sometimes	60	36.1
Rarely	27	16.3
Never	3	1.8

Table 10

School Psychologists' Identified Reasons For Rarely or Never Including Assessments

Rating	*n*	%
Limited resources/test kits	21	70.0
Limited time/too large caseload	12	40.0
Limited training/lack of qualifications	12	40.0
Lack of usefulness/value to evaluations	4	13.3
Other	9	30.0

3b. For which special education disability categories do school psychologists assess executive functions? When presented with yes/no options for each special education disability category recognized by IDEA 2004, participants were asked to indicate for which suspected disability categories they include the assessment of executive functions. Table 11 represents participants' yes endorsements for each disability category. The majority of participants indicated that they include executive functions assessment when they suspect autism (*n* = 132), emotional disturbance (*n* = 140), intellectual disability (*n* = 94), multiple disabilities (*n* = 107), other health impairment (*n* = 154), specific learning disability (*n*= 155), and traumatic brain injury (*n* = 149).

Table 11

School Psychologists' Indications of Disability Categories for Which They Assess Executive Functions

Disability Category	*n*	%
Autism	132	79.0
Deaf-Blindness	24	14.4
Deafness	26	15.6
Emotional disturbance	140	83.8
Hearing impairment	33	19.9
Intellectual disability	94	56.3
Multiple disabilities	107	64.5
Orthopedic disability	23	13.8
Other Health impairment	154	92.2
Specific learning disability	155	92.8
Speech or language impairment	82	49.1
Traumatic brain injury	149	89.2
Visual impairment	32	19.3

3c. Which measures of executive functions do school psychologists include in their psychoeducational evaluations? In a structured, Likert format question, participants were asked to rate their frequency of use for 11 different executive function assessment tools. Table 12 presents the 11 assessment tools and the participants' ratings of frequency from *almost always* to *never*. The largest group of participants indicated

using the Behavior Rating Inventory of Executive Function (BRIEF) *often* (*n* = 50). All other assessment tools were rated as being used less frequently or not at all.

Table 12

School Psychologists' Frequency Ratings for Use of Measures of Executive Functions

	Almost Always		Often		Sometimes		Rarely		Never	
Measure	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
BRIEF	24	14.5	50	30.3	45	27.3	17	10.3	29	17.6
D-KEFS	2	1.2	16	9.6	28	16.8	14	8.4	107	64.1
NEPSY- II	2	1.2	28	17.0	32	19.4	25	15.2	78	47.3
PAL	0	0.0	6	3.6	14	8.4	12	7.2	134	80.7
CEFI	1	0.6	3	1.8	13	7.8	8	4.8	141	84.9
MEFS	0	0.0	0	0.0	4	2.4	4	2.4	158	95.2
BDEFS	0	0.0	0	0.0	4	2.4	6	3.6	156	94.0
D-REF	3	1.8	0	0.0	0	0.0	3	1.8	160	96.4
BADS	0	0.0	0	0.0	2	1.2	5	3.0	159	95.8
WCST	0	0.0	5	3.0	12	7.3	12	7.3	136	82.4
Tea-Ch	0	0.0	2	1.2	4	2.4	10	6.1	149	90.3

Note. BRIEF = Behavior Rating Inventory of Executive Functions; D-KEFS = The Delis-Kaplan Executive Function System; NEPSY- II = The Developmental Neurological Assessment, Second Edition; PAL = Process Assessment of the Learner; CEFI = Comprehensive Executive Function Inventory; MEFS = McCloskey Executive Function Scale; BDEFS = Barkley Deficits in Executive Functioning Scale; D-REF = Delis-Rating of Executive Function; BADS = Behavioural Assessment of the Dysexecutive Syndrome; WCST = Wisconsin Card Sorting Test; Tea-Ch = Test of Everyday Attention for Children

4a. How often do school psychologists include recommendations to remediate executive function deficits in their psychoeducational evaluations? In a structured, Likert format question, participants were asked to rate how often they include the recommendation of executive function interventions in their psychoeducational evaluations. Table 13 illustrates participants' ratings of frequency of recommendation. The largest group of participants reported that they *sometimes* include recommendations for executive function interventions (n = 62). In addition, participants who responded *rarely* or *never* were then asked to indicate possible reasons why they do not include recommendations for executive functions interventions in their evaluations. Table 14 presents the responses for those 28 participants. The majority of participants indicated limited resources/intervention tools (n = 15) and limited training/lack of qualifications (n = 13) as the reasons for not including recommendations for executive function interventions in their psychoeducational evaluations.

Table 13

School Psychologists' Ratings of Frequency in the Recommendation of Executive Functions Interventions

Rating	*n*	%
Almost always	19	11.4
Often	58	34.7
Sometimes	62	37.1
Rarely	16	9.6
Never	12	7.2

Table 14

School Psychologists' Identified Reasons For Rarely or Never Recommending Interventions

Rating	*n*	%
Limited resources/intervention tools	15	53.5
Limited training/lack of qualifications	13	46.4
Lack of usefulness/value to school setting	6	21.4
Lack of teacher support/fidelity	5	17.8
Other	9	32.1

4b. For which special education disability categories do school psychologists recommend executive function interventions? When presented with yes/no options for each special education disability category recognized by IDEA 2004, participants were asked to indicate for which suspected disability categories they include recommendations for executive function interventions. Table 15 represents participants' yes endorsements for each disability category. The majority of participants indicated that they include recommendations for executive functions interventions when they identify autism (*n* = 145), emotional disturbance (*n* = 146), intellectual disability (*n* = 120), multiple disabilities (*n* = 122), other health impairment (*n* = 156), specific learning disability (*n*= 161), speech or language impairment (*n* =112), and traumatic brain injury (*n* = 156).

Table 15

School Psychologists Indications of Disability Categories for Which They Recommend Executive Functions Interventions

Disability Category	*n*	%
Autism	145	86.8
Deaf-blindness	36	21.6
Deafness	37	22.2
Emotional disturbance	146	87.4
Hearing impairment	38	22.9
Intellectual disability	120	71.9
Multiple disabilities	122	73.1
Orthopedic disability	34	20.4
Other health impairment	156	93.4
Specific learning disability	162	97.0
Speech or language impairment	112	67.1
Traumatic brain injury	156	93.4
Visual impairment	40	24.0

4c. Which interventions for executive function deficits do school psychologists recommend in their psychoeducational evaluations? In a structured, Likert-format question, participants were asked to rate their frequency of recommendation for 21 different executive function interventions and strategies. Table 16 documents the 21 interventions and the participants' ratings of frequency from *almost always* to *never*. The largest groups of participants indicated that they *often* recommend classroom

environment modifications (*n* = 76), teacher modeling (*n* = 66), self-monitoring strategies (*n* = 80), time management strategies (*n* = 79), homework assignment book/agenda (*n* = 74), direct instruction (*n* = 65), small group/resource room instruction (*n* = 63), guided practice (*n* = 59), differentiated instruction (*n* = 73), positive reinforcement (*n* = 74), and behavior chart/reinforcement schedule (*n* = 73).

Table 16

School Psychologists' Frequency Ratings for Recommendation of Executive Function Interventions

	Almost Always		Often		Sometimes		Rarely		Never	
Intervention	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Classroom modifications	52	31.1	76	45.5	29	17.4	5	3.0	5	3.0
Afterschool program	0	0.0	15	9.2	33	20.2	47	28.8	68	41.7
Self-regulation program	4	2.4	14	8.5	43	26.1	23	13.9	81	49.1
Teacher modeling	31	18.6	66	39.5	50	29.9	9	5.4	11	6.6
Study skills	9	5.4	45	26.9	60	35.9	19	11.4	34	20.4
Self-monitoring	32	19.2	80	47.9	45	26.9	5	3.0	5	3.0
Time management	37	22.3	79	47.6	35	21.1	6	3.6	9	5.4
Verbal reprimands	0	0.0	3	1.8	13	7.9	28	17.0	121	73.3
Agenda	47	28.1	74	44.9	28	16.8	7	4.2	10	6.0
Direct instruction	27	16.2	65	38.9	55	32.9	11	6.6	9	5.4
Small group instruction	16	9.7	63	38.2	56	33.9	21	12.7	9	5.5
Peer mentor/buddy	5	3.0	51	30.9	67	40.6	26	15.8	16	9.7
Paraprofessional	8	4.8	44	26.5	69	41.6	28	16.9	17	10.2

	Almost Always		Often		Sometimes		Rarely		Never	
Intervention	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Guided practice	18	10.8	59	35.3	55	32.9	17	10.2	18	10.8
Differentiated instruction	34	20.6	73	44.2	40	24.2	10	6.1	8	4.8
Positive reinforcement	62	37.3	74	44.6	18	10.8	5	3.0	7	4.2
Behavior chart	21	12.7	73	44.2	56	33.9	9	5.5	6	3.2
CBT	9	5.4	25	15.1	32	19.3	43	25.9	57	34.3
PBSP	18	10.9	37	22.4	57	34.5	26	15.8	27	16.4
Motivational interviewing	3	1.8	14	8.5	25	15.2	34	20.6	89	53.9
Mindfulness training	4	2.4	17	10.3	29	17.6	39	23.6	76	46.1

Note. CBT = Cognitive-Behavioral Therapy; PBSP = Positive Behavior Support Plan

5a. Which assessment procedures do school psychologists identify as important for students demonstrating deficits in executive functions? When presented with three vignettes describing different profiles of executive function deficits, participants were asked to indicate which assessment procedures they would include in a psychoeducational evaluation/reevaluation. Each assessment procedure was presented in a yes/no format. Table 17 presents participants' yes endorsements for each assessment procedure across all three vignettes. Further analysis indicates that the majority of participants included classroom observations, parent interviews/input, teacher interviews/input, child interview/input, review of records, social/emotional/behavioral rating scales, cognitive/intellectual ability assessments, academic achievement assessments, ADHD rating sales, and executive functions rating scales in their evaluation/reevaluation, regardless of the executive functions deficits profile.

Table 17

School Psychologists' Indications of Assessments/Procedures to Include in Evaluations of Students With Executive Functions Deficits (n = 150)

	"Lazy" Profile		"Inattentive" Profile		"Internalizing/ Externalizing" Profile	
Assessment/Procedure	*n*	%	*n*	%	*n*	%
Parent interviews/input	150	100.0	150	100.0	149	99.3
Teacher interviews/input	150	100.0	150	100.0	149	99.3
Review of records	150	100.0	147	98.0	150	100.0
Classroom observations	149	99.3	150	100.0	150	100.0
Child interview/input	148	98.7	140	93.3	150	100.0
Behavioral rating scales	144	96.0	142	95.3	150	100.0
Cognitive assessments	144	96.0	130	86.7	135	90.0
Achievement assessments	140	93.3	134	89.3	135	90.0
Executive functions scales	127	84.7	129	86.0	105	70.0
ADHD scales	102	68.0	139	92.7	68	45.3
Neuropsychological assessments	57	38.0	70	46.7	65	43.3
FBA	41	27.3	59	39.3	90	60.0
Speech/language assessments	20	13.3	28	18.7	16	10.7
OT assessments	13	8.7	11	7.3	1	0.7
Adaptive behavior scales	19	12.7	26	17.4	31	20.8
Autism scales	2	1.4	2	1.4	4	2.7

Note. FBA = Functional Behavior Assessment; OT = occupational therapy

5b. Which levels of regular education and special education services do school psychologists recommend for students demonstrating deficits in executive functions? When presented with two vignettes describing different profiles of executive function deficits, participants were asked to indicate which levels of intervention would be best suited to meet the student's needs. Each level of intervention was presented in a yes/no format. Table 18 presents participants' yes endorsements for each level of intervention across both vignettes. When presented with a "lazy" profile, participants were more likely to recommend Tier 1 (n = 65) or Tier 2 (n = 91) in the RtI Model. However, when presented with an "internalizing/externalizing" profile, participants were more likely to recommend Tier 3 in the RtI model (n = 57), a Section 504 Accommodation Plan (n = 69), and Special education services/Individualized Education Plan (IEP) (n = 66). If participants endorsed special education services/IEP, they were asked to indicate for which special education disability category recognized by IDEA 2004 the student would qualify. Table 19 presents the responses for the 10 participants who responded to the "lazy" profile and the 66 participants who responded to the "internalizing/externalizing" profile. When presented with a "lazy" profile, the participants identified other health impairment (n = 5) and neurological impairment (n = 4) as possible disability categories. It is important to note that neurological impairment is a category that is recognized in Massachusetts, but not in any other state included in this sample. When presented with an "internalizing/externalizing" profile, most participants identified emotional disturbance as the possible category (n = 51).

When presented with a vignette describing an "inattentive" profile of executive function deficits, participants were asked to indicate for which additional special

education disability category (if any) the student would qualify. The student was already identified as having a specific learning disability, and additional disability categories were presented in a yes/no format. Table 20 shows the number of yes endorsements for each disability category. The largest number of participants indicated that the student would additionally qualify for other health impairment based on the profile of executive function deficits (n = 60).

Table 18

School Psychologists' Indications of Recommended Services for Students with Executive Functions Deficits

	"Lazy" Profile		"Internalizing/Externalizing" Profile	
Education Service	*n* (n = 149)	%	*n* (n =150)	%
Tier 1 in RtI Model of Intervention	65	43.9	36	24.0
Tier 2 in RtI Model of Intervention	91	61.1	54	36.0
Tier 3 in RtI Model of Intervention	40	27.0	57	38.0
Section 504 Accommodation Plan	52	34.9	69	46.9
Special Education Services/IEP	10	6.8	66	44.6

Table 19

School Psychologists' Identified Disability for Special Education Services

	"Lazy" Profile		"Internalizing/Externalizing" Profile	
Disability Category	*n* (n =10)	%	*n* (n = 66)	%
Autism	0	0.0	0	0.0
Deaf-blindness	0	0.0	0	0.0
Deafness	0	0.0	0	0.0
Emotional disturbance	0	0.0	51	77.3
Hearing impairment	0	0.0	0	0.0
Intellectual disability	0	0.0	0	0.0
Multiple disabilities	0	0.0	3	4.5
Orthopedic impairment	0	0.0	0	0.0
Other health impairment	5	50.0	27	40.9
Specific learning disability	6	60.0	2	3.0
Speech or language impairment	0	0.0	0	0.0
Traumatic brain injury	0	0.0	0	0.0
Visual impairment	0	0.0	0	0.0
Neurological impairment	4	40.0	0	0.0

Table 20

School Psychologists' Identified Additional Disability(ies) for Student with "Inattentive" Deficit Profile

Disability Category	*n*	%
Autism	0	0.0
Deaf-blindness	0	0.0
Deafness	0	0.0
Emotional disturbance	1	0.7
Hearing impairment	0	0.0
Intellectual disability	1	0.7
Multiple disabilities	10	6.7
Orthopedic disability	1	0.7
Other health impairment	60	40.0
Specific learning disability	1	0.7
Speech or language impairment	3	2.0
Traumatic brain injury	0	0.0
Visual impairment	0	0.0

5c. Which interventions and strategies do school psychologists recommend for students with executive function deficits? When presented with three vignettes describing different profiles of executive function deficits, participants were asked to indicate which interventions they would recommend in a psychoeducational evaluation/reevaluation. Each intervention was presented in a yes/no format. Table 21

presents participants' yes endorsements for each intervention across all three vignettes. Further analysis indicates that the majority of participants included classroom environment modifications, positive behavior support plan, and teacher training/consultation, in their evaluation/reevaluation, regardless of the executive functions deficit profile.

Table 21

School Psychologists Indications of Interventions to Recommend in Evaluations of Students with Executive Functions Deficits

	"Lazy" Profile		"Inattentive" Profile		"Internalizing/Externalizing" Profile	
Intervention/Strategy	*n*	%	*n*	%	*n*	%
Classroom modifications	136	90.7	145	96.7	125	84.5
Study skills group/course	128	85.3	--	--	81	54.7
Teacher consultation	123	82.0	130	86.7	115	77.7
Behavior chart	114	76.0	140	93.3	70	47.3
PBSP	97	65.1	90	60.0	114	77.6
Parent training	70	46.7	82	54.7	87	58.4
Peer tutoring	58	38.7	53	35.3	24	16.2
Motivational interviewing	56	37.3	35	23.3	70	47.3
After school program	50	33.6	48	32.0	30	20.3
CBT	34	22.7	29	19.3	124	83.8
Counseling program	21	14.0	22	14.8	28	18.9
Group counseling	15	10.0	19	12.8	92	62.2

	"Lazy" Profile		"Inattentive" Profile		"Internalizing/Externalizing" Profile	
Intervention/Strategy	*n*	%	*n*	%	*n*	%
ABA	5	3.3	11	7.3	13	8.8
Review of sight words	--	--	140	93.3	--	--
Self-monitoring strategies	--	--	140	93.3	129	86.6
Pediatrician/psychiatrist	--	--	106	70.7	142	95.3
Pharmacology	--	--	52	34.7	88	59.5

Note. PBSP= Positive Behavior Support Plan; CBT = Cognitive- Behavioral Therapy; ABA = Applied Behavior Analysis

6a. Do Nationally Certified School Psychologists (NCSPs) assess executive functions and/or recommend executive functions interventions more often than non-NCSPs? For the remaining research questions, the mean frequencies of executive functions assessment and recommendation of executive functions interventions were compared between school psychologists grouped by demographic characteristics. Table 22 presents the means and standard deviations for these groups.

Table 22

Means and Standard Deviations for Assessment and Intervention Grouped by Demographic Characteristics

	Assessment		Intervention	
	M	*SD*	*M*	*SD*
NCSP	3.25	0.53	2.85	1.13
Non-NCSP	1.75	0.82	2.43	0.86
0 to 5 years	1.97	1.01	2.53	0.91
6 to 10 years	3.00	0.00	2.52	1.21
11 to 15 years	3.83	0.39	2.78	0.90
16 to 20 years	3.00	0.00	3.23	1.24
21+ years	3.00	0.00	3.07	1.22
Master's	3.00	0.00	3.45	1.21
Master's +	3.00	0.00	2.68	1.25
Education specialist	2.80	0.98	2.80	0.88
Doctorate	1.14	0.74	1.93	0.65
New Jersey	2.85	0.55	2.43	1.09
Pennsylvania	1.00	0.00	2.05	0.67
Delaware	2.00	1.85	1.75	0.71
New York	2.09	0.52	2.70	0.92
Ohio	2.72	0.98	3.00	0.82
Massachusetts	3.50	0.51	2.92	1.05

The first comparison research question compared the frequency of assessment and intervention with executive functions between school psychologists with NCSP status and school psychologists without this status. NCSPs (M = 3.25, SD = .53) reported assessing executive functions significantly more often than non-NCSPs (M = 1.75, SD = .82), t(14.25, p = .000). In addition, NCSPs (M = 2.85, SD = 1.13) reported recommending executive functions interventions significantly more often than non-NCSPs (M = 2.43, SD = .86), t(2.64), p = .009).

6b. Do school psychologists with more years of experience assess executive functions and/or recommend executive functions interventions more often than school psychologists with fewer years of experience? Years of experience in school psychology and the frequency of executive functions assessment was examined. A one-way ANOVA between the number of years of experience and frequency of executive functions assessment revealed significance, F(4, 161) = 35.0, p = .000). Table 23 presents the ANOVA data. Post hoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significant difference was between school psychologists with 0 to 5 years of experience and school psychologists with 6 to 10 years of experience or more (p = .000 for all comparisons). School psychologists with 6 to 10 years of experience or more reported assessing executive functions more frequently. Additional trends revealed that school psychologists with 11 to 15 years of experience assessed executive functions significantly more often than school psychologists with 0 to 5 years of experience (p = .000), 6 to 10 years of experience (p = .001), 16 to 20 years of experience (p = .018), and 21 years or more experience (p = .011).

Years of experience in school psychology and the frequency of recommendation of executive functions interventions was assessed. A one-way ANOVA between the number of years of experience and frequency of recommendation of executive functions interventions revealed no significance, $F(4, 162) = 2.27$, $p = .074$).

Table 23

Main Effects for School Psychologists' Years of Experience and Frequency of Executive Functions Assessment and Recommendation of Interventions

	SS	*df*	*F*	*p*
Assessment	78.43	4	35.00	.000
Interventions	9.15	4	2.27	.074

6c. Do school psychologists with higher levels of education assess executive functions and/or recommend executive functions interventions more often than school psychologists with lower levels of education? Highest degree earned and the frequency of executive functions assessment was examined. A one-way ANOVA between the highest degree earned and frequency of executive functions assessment revealed significance, $F(3, 160) = 41.16$, $p = .000$), as presented in Table 24. Post hoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significant difference was between doctoral level school psychologists and school psychologists with master's degrees ($p = .000$), master's degree plus additional credits ($p = .000$), and Education specialist (or equivalent) degrees ($p = .000$). Doctoral level school psychologists reported assessing executive functions significantly less often than school psychologists with lower levels of education.

Highest degree earned and the frequency of recommendation of executive functions interventions was examined. A one-way ANOVA between the highest degree earned and frequency of recommendation of executive functions interventions revealed significance, $F(3, 160) = 8.33$, $p = .000$). Post hoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significant difference was between doctoral level school psychologists and school psychologists with master's degrees ($p = .000$), master's degree plus additional credits ($p = .011$), and education specialist (or equivalent) degrees ($p = .000$). As with assessment, doctoral level school psychologists reported recommending executive functions interventions significantly less often than school psychologists with lower levels of education, as shown in Table 24. .

Table 24

Main Effects for School Psychologists' Highest Degree Earned and Frequency of Executive Functions Assessment and Recommendation of Interventions

	SS	*df*	*F*	*p*
Assessment	73.30	3	41.16	.000
Interventions	23.89	3	8.33	.000

6d. Do school psychologists who practice in certain states assess executive functions and/or recommend executive functions interventions more often than school psychologists who practice in other states? Location of current practice and the frequency of executive functions assessment was examined. It is important to note that only the responses from participants who practice in the six most frequently reported states (New Jersey, Pennsylvania, Delaware, New York, Ohio, and Massachusetts) were

included in this analysis. A one-way ANOVA between current location of practice and frequency of executive functions assessment revealed significance, $F(5, 130) = 35.50$, $p = .000$). Table 25 presents the ANOVA data. Post hoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significant difference was between school psychologists practicing in Pennsylvania and school psychologists practicing in New Jersey ($p = .000$), Delaware ($p = .018$), New York ($p = .000$), Ohio ($p = .000$) or Massachusetts ($p = .000$). School psychologists in Pennsylvania reported assessing executive functions significantly less often than school psychologists in other states. Additional trends revealed that school psychologists in Massachusetts assessed executive functions significantly more often than school psychologists in Pennsylvania ($p = .000$), Delaware ($p = .000$), Ohio ($p = .001$, or New York ($p = .000$).

Location of current practice and the frequency of recommendation of executive functions interventions was examined. It is important to note that only the responses from participants who practice in the six most frequently reported states (New Jersey, Pennsylvania, Delaware, New York, Ohio, and Massachusetts) were included in this analysis. A one-way ANOVA between current location of practice and frequency of recommendation of executive functions interventions revealed significance, $F(5, 131) = 4.08$, $p = .000$). Post hoc testing, utilizing the Bonferroni multiple comparisons, for further analysis revealed the significant difference was between school psychologists practicing in Ohio and school psychologists practicing in Pennsylvania ($p = .009$) and Delaware ($p = .015$). School psychologists in Ohio reported assessing executive functions significantly more often than school psychologists in Pennsylvania or Delaware. Additional trends revealed that school psychologists in Massachusetts assessed

executive functions significantly more often than school psychologists in Pennsylvania (p = .011) or Delaware (p = .021).

Table 25

Main Effects for School Psychologists' Practice Location and Frequency of Executive Functions Assessment and Recommendation of Interventions

	SS	*df*	*F*	*p*
Assessment	93.47	5	35.50	.000
Interventions	20.14	5	4.88	.000

Chapter 5: Discussion

The purpose of this study was to examine school psychologists' frequency of and competency in executive functions assessment and intervention. This study also examined school psychologists' perceptions about executive functions, possible reasons for not assessing executive functions, and application of executive functions knowledge and competency. A total of 167 school psychologists, primarily from six different states, completed an online survey about these topics.

Perception Research Questions

The first research question (1a) aimed to determine which cognitive abilities school psychologists thought were most important when evaluating students with academic problems. When asked to write their top five cognitive abilities, most school psychologists reported verbal comprehension/reasoning as most important. Verbal and nonverbal reasoning (combined) was identified as most important to the second highest number of school psychologists. Executive functions were only rated as most important by seven participants.

The second research question (1b) asked school psychologists to rate nine different cognitive abilities from most relevant to least relevant when evaluating students with academic problems. Roughly half of the participants rated executive functions within the top five relevant cognitive abilities. However, only 7.9% of participants rated executive functions as the most relevant cognitive ability in evaluations of students with academic problems. From this data, it appears that participants did not independently identify executive functions as important to their evaluations of students with academic difficulties. When given executive functions as a choice, half of the participants rated

them as relevant (top five) in evaluations for students with academic problems. This data indicates that school psychologists' value perceptions of executive functions do not coincide with executive functions' importance as noted in research (Best et al., 2010; Brydges et al., 2012; Hofmann et al. 2012; McCloskey & Perkins, 2013; McCloskey et al., 2009). Although there is no standard for how executive functions or any other cognitive ability should rank in importance to psychoeducational evaluations, it was hoped that executive functions would be ranked as highly important.

Competency Research Questions

The first competency research question (2a) examined school psychologists' definitions of executive functions. From their answers to Likert format questions, most participants reported adequate knowledge of a common definition of executive functions: multidimensional capacities that cue our thoughts, feelings, perceptions, and actions (McCloskey et al., 2009). However, participants' responses were not as clear when asked if executive functions are typically considered part of the general intelligence factor (*g*) and whether executive functions are measured on intelligence tests. Approximately 29% of school psychologists believed that intelligence tests measure executive functions, while 38% believed that executive functions are part of *g*. In addition, about half of school psychologists disagreed with a statement that executive functions are conceptualized as a general executor. This indicates that about half of the participants agreed or were uncertain (neutral) about a commonly believed myth regarding executive functions.

When asked questions related to special education classifications and executive functions (2b), almost half of the participants said that deficits in executive functions are

indicative of learning disabilities. Although this demonstrates that school psychologists understand that executive functions are important to consider when identifying learning disabilities, executive function deficits alone are not indicative of learning disabilities (DuPaul et al., 2013; Feifer, 2013; Flanagan et al., 2013; Hale & Fiorello, 2004; Semrud-Clikeman, 2005). In addition, most participants (about 69%) agreed that deficits in executive functions are indicative of producing disabilities, as supported by some researchers (Denckla, 2007; McCloskey et al., 2009). Most participants also recognized that children can have deficits in executive functions that are not indicative of ADHD (Brydges et al., 2012; Carney et al., 2013; Robinson et al., 2009; Rosenthal et al., 2013; Rowe et al., 2006).

When asked about IDEA 2004 classifications (2b), about 36% of the participants reported that children with executive function deficits should qualify as having specific learning disability, whereas 39% of participants reported that children with executive function deficits should qualify as having other health impairment. About 30% of participants opted for neutrality on these questions. These results indicate a lack of consensus on how to identify children with executive functions deficits.

In categorizing cognitive capacities (2c), most participants recognized task initiation and cognitive flexibility as executive functions. This coincides with several major theoretical conceptualizations (Barkley, 1997; Dawson & Guare, 2010; McCloskey et al., 2009; Miller, 2013). However, as previously discussed, debate continues about the inclusion of working memory as an executive function (Dawson & Guare 2010; Kaufman, 2010; McCloskey & Perkins, 2013; Miller, 2013). In the current study, most participants (83%) consider working memory an executive function.

Participants were also asked to rate their own competency with regard to the assessment of and intervention in executive functions (2d). Approximately half of the participants (55%) rated themselves as competent or very competent. This differs from previous studies aimed at assessing school psychologists' competency with neuropsychological principles. For example, in studies about neuropsychological training and use in the schools, most school psychologists did not claim expertise in neuropsychological principles (Leavell & Lewandowski, 1988) and most school psychology training programs report little to no training in neuropsychology (Walker, Boling, & Cobb, 1999).

One possibility for this difference is that school psychologists may have received more training with executive functions than other neuropsychological constructs. When asked about their training opportunities with regard to executive functions (2e), most participants reported books/texts/research articles and workshops/conferences as their main sources of training. Less than half of the participants (47%) reported receiving training about executive functions from a graduate course toward their degree. This coincides with research claims that school psychology programs need to offer more training in neuropsychology (D'Amato, 2008; Decker, 2008; Hynd, 1980; Witsken et al., 2008).

Frequency of Assessment Research Questions

When asked how often school psychologists include executive functions assessment in their psychoeducational evaluations (3a), less than half of participants (45%) reported assessing executive functions regularly (often or more frequently). The largest group of school psychologists reported sometimes assessing executive functions (36%). Of those

participants who reported rarely or never assessing executive functions (18% of the entire sample), limited resources and/or test kits was reported as the dominant reason. Although there is no standard for how often executive functions should be assessed, it is discouraging that over half of the participants in this study did not regularly include the assessment of executive functions in their psychoeducational evaluations.

It is also important to note that while 45% of school psychologists rated themselves as neutral, incompetent, or very incompetent regarding executive functions, approximately 81% of participants reported assessing executive functions sometimes or more frequently. This data demonstrates a possible disparity between the frequency of executive functions assessment and school psychologists' feelings of competency. It is possible that participants reported assessing executive functions while not feeling competent or well trained in this type of assessment.

However, when asked for which disabilities school psychologists tend to include executive functions assessments (3b), the overwhelming majority of participants indicated that they include executive functions assessments when identifying Autism, emotional disturbance, intellectual disability, multiple disabilities, other health impairment, specific learning disability, and traumatic brain injury. According to the U.S. Department of Education, these accounted for 70% of the special education population in U.S. schools in the 2011-2012 school year (Kena et al., 2014). Therefore, participants in this study seem to be underreporting their frequency of executive functions assessment in general or are over reporting their use of executive functions assessments with specific disabilities.

Participants also rated their frequency of use when given a list of common executive function measures (3c). Although participants reported using executive functions assessments when identifying the most common special education classifications, they did not report frequent use of common executive functions assessment tools. The most commonly used measure, the BRIEF, was reportedly used regularly (often or more frequently) by less than half the participants (44%). The next most frequently used measure was the NEPSY (used regularly by 18% of participants). These results indicate once again that school psychologists may be over reporting their use of executive functions assessments with specific disabilities or they may be using other assessments not presented in this study. This finding is similar to previous studies that have reported infrequent use of other neuropsychological measures by school psychologists (Handler & DuPaul, 2005; Koonce, 2007; Slonaker & Pass, 2011).

Frequency of Intervention Research Questions

When asked how often school psychologists include recommendations for executive functions interventions in their psychoeducational evaluations (4a), less than half of participants (46%) reported recommending executive functions interventions regularly (often or more frequently). The largest group of school psychologists reported sometimes including executive functions interventions (37%). Of those participants who reported rarely or never including executive functions interventions (17% of the entire sample), limited resources and/or intervention tools and limited training/lack of qualifications were reported as the dominant reasons. Although there is no standard for when or how often executive functions recommendations should be included in psychoeducational reports, it was hoped that most participants would include them regularly.

However, when asked for which disabilities school psychologists tend to include executive functions interventions (4b), the overwhelming majority of participants indicated that they recommend executive functions interventions when identifying autism, emotional disturbance, intellectual disability, multiple disabilities, other health impairment, specific learning disability, speech or language impairment, and traumatic brain injury. According to the U.S. Department of Education, these disabilities (including speech or language impairment) accounted for 91% of the special education population in U.S. schools in the 2011-2012 school year (Kena et al., 2014). Therefore, participants in this study seem to be underreporting their frequency of executive functions interventions in general or are over reporting their recommendation of executive functions interventions with specific disabilities. This is the same pattern as noted with the frequency of executive functions assessments.

Participants also rated their frequency of recommendation when given a list of common executive function interventions (4c). The most commonly recommended interventions included classroom environment modifications, teacher modeling, self-monitoring strategies, time management strategies, homework assignment book/agenda, direct instruction, small group/resource room instruction, guided practice, differentiated instruction, positive reinforcement, and behavior chart/reinforcement schedule. There is a discrepancy between the reported frequency of general recommendation of executive functions interventions (4a) and the reported frequency of specific recommendations of executive functions recommendations (4c), with participants reporting recommending the specific interventions more often than interventions in general. It is hypothesized that

participants were unaware of what interventions were considered to target executive functions when they answered the more general question (4a).

Application Research Questions

When presented with three vignettes based on profiles presented in previous research (McCloskey et al., 2009), school psychologists were asked to identify which assessment procedures they would include in the psychoeducational evaluations (5a). Although many assessment strategies were indicated, regardless of executive function deficits profile, participants were more likely to include a Functional Behavior Assessment (FBA) for the student with the "externalizing/internalizing" profile. This seems likely, as the student in this profile exhibited significantly more observable and measureable maladaptive behaviors than students in the other vignettes. In addition, the majority of participants did not indicate use of neuropsychological assessments when assessing all three of these students. This further supports findings from other studies that have reported school psychologists' use of other neuropsychological measures as infrequent (Handler & DuPaul, 2005; Koonce, 2007; Slonaker & Pass, 2011).

Participants were also asked to determine service levels for the students presented in the three vignettes (5b). Participants were more likely to recommend Tier 2 level of service for the student with the "lazy" profile, while they were more likely to recommend a 504 Accommodation Plan for the student with the "externalizing/internalizing" profile. If participants did recommend special education services, responses were split amongst specific learning disability, other health impairment, and neurological impairment for the student with the "lazy" profile. However, participants indicated emotional disturbance for the student with the "externalizing/internalizing profile." The "inattentive" vignette was

presented as a reevaluation, so participants were asked if there were additional special education classifications that the student qualified for based on her results. The largest group of participants indicated that this student qualified for other health impairment in addition to SLD based on her "inattentive" symptoms.

Recommendations for interventions were also examined for each presented vignette. Regardless of executive function deficits profiles, the majority of participants reported recommendations of classroom environment modifications, behavior chart/reinforcement schedule, positive behavior support plan, and teacher training/consultation. Notably, CBT and group counseling were more often recommended for the student with the externalizing/internalizing profile than students in the other vignettes. When presented as a possibility, self-monitoring strategies were frequently recommended by participants. However, manual-based counseling programs (e.g. SuperFlex) were recommended infrequently for all three vignettes.

Comparison Research Questions

To examine potential frequency disparities in executive functions assessment and recommendation for interventions, data was compared by NCSP status (6a), years of experience (6b), levels of education (6c), and location of current practice (6d). Results indicated that school psychologists with NCSP credentials were more likely to assess and recommend interventions for executive functions. In addition, school psychologists with 11 to 15 years of experience in the field reported assessing executive functions more frequently than school psychologists in any other experience group. It is hypothesized that the combination of familiarity in the field and more recent training (focused on neuropsychology) made this group more likely to assess executive functions.

Unexpectedly, school psychologists at the doctoral level reported significantly less frequent assessment and recommendation of executive functions than peers with master's degrees and education specialist (or equivalent) degrees. This is dissimilar to findings from other studies that doctoral level school psychologists may have more training in neuropsychology than school psychologists with lower level degrees (D'Amato, 1990; Delucca, 2012; Witsken et al., 2008). It is hypothesized that the lower number of doctoral level school psychologists in the sample (n = 29) may have contributed to this finding. It is also possible that doctoral level school psychologists may have differing roles than lower level school psychologists. For instance, they may do more counseling and fewer evaluations in general.

Finally, results of state comparisons indicated that school psychologists in Massachusetts reported more frequent assessment of executive functions than school psychologists in other states. School psychologists in Massachusetts also reported recommending executive functions interventions more often than school psychologists in Pennsylvania and Delaware. It is hypothesized that Massachusetts school psychologists are more likely to assess executive functions due to the availability of the neurological impairment special education classification. Although there is no way to measure this correlation using the current data, there may be a relationship between availability of classifications and which assessments school psychologists are willing to use.

Limitations

A number of limitations are noted for the current study, the most significant being the method of recruitment. Because participants were recruited through e-mail and convenience sampling, the external validity of this study is questionable. The school

psychologists who participated may not be a representative sample of school psychologists around the country, making it difficult to generalize the results beyond this current study. In addition, there may be selection bias, as participants may have chosen be involved in the study due to their perceived knowledge of cognitive assessment and intervention practices. Although neither the survey title nor the cover/introduction letter mentioned executive functions, the participants knew the survey would be about cognitive processes related to learning and behavior.

The reliability and validity of the data source are also questionable because the survey was developed by the examiner and no standardized questionnaire was used. Because survey questions were not tested for psychometric properties, the construct validity of the survey is also limited. Items included in the survey may not be reliable assessments of school psychologists' perceptions, knowledge, frequency, and application of executive functions assessment intervention, as anticipated. For example, school psychologists may not have interpreted questions about their own practices in assessment and intervention as such. Face validity was obtained by consultation with dissertation committee members to ensure that test items appeared to be measuring intended outcomes. However, no other psychometric properties or measures of validity were used.

As with any survey or questionnaire research, responder bias is a possible limitation as participants reported on their own perceptions and beliefs about their practices. It is possible that participants succumbed to demand characteristics or social desirability bias in order to appear more competent in the assessment and intervention practices being studied. It is suspected that demand characteristics may have influenced participants' responses when asked their frequency of executive functions assessment and

recommendations for interventions with regard to specific special education classifications. They reported significantly more frequency assessment and intervention with specific classifications than they did in when considering their general practices. One possibility is that they allowed their knowledge of executive functions to change their frequency ratings. Direct observations and more standardized measures of assessment and intervention practices would be more valid; however, these were not feasible for the current study.

Future Directions

Continued efforts in increasing school psychologists' competency and frequency of executive functions assessment and intervention are vital. As noted throughout this study, executive functions are crucial to everyday functioning with regard to organizing, planning, inhibiting, shifting, focusing, revising, etc. They are also implicated as deficient in many of the most commonly identified childhood disorders and special education classifications. However, as noted in this study and in previous research, school psychologists require more training in executive functions and neuropsychological principles in their graduate training programs (D'Amato, 2008; Decker, 2008; Hynd, 1980; Witsken et al., 2008). Universities and colleges should consider adding more coursework and/or specializations in neuropsychology in order to increase school psychologists' knowledge, competency, frequency, and application of school neuropsychological assessment, consultation, and interventions.

Furthermore, the National Association of School Psychologists may facilitate or require more training opportunities in the emerging field of school neuropsychology. With the increased number of children in schools with medical conditions that affect

school performance, the increased use of medications given to children, the increased incidence of educational and behavioral problems in children, and the increased emphasis on the identification of processing disorders within learning disabilities, there is a growing need for school neuropsychology (Cleary & Scott, 2011; Decker, 2008; Miller, 2013; Schmitt & Wodrich, 2008). Research has demonstrated the importance of using neuropsychological principles to help children with learning disabilities who are not responding to typical interventions, to identify the potential causes for children's difficulties and recommend more targeted interventions, and to more effectively consult with teachers about students' cognitive, academic, and behavioral difficulties (D'Amato, 1990; Semrud-Clikeman, 2005; Witsken et al., 2008). Considering this information, NASP should start by increasing the opportunities for training in neuropsychology while moving toward a more regulated system of incorporating pediatric neuropsychology into the schools.

An additional consideration raised by this study is the ambiguity surrounding the special education identification of children who are exhibiting executive function deficits. Participants in this study identified children with executive functions difficulties as learning disabled, other health impaired, emotionally disturbed, and neutral (indicating a lack of clarity on how to identify). However, in Massachusetts, state regulation 603 CMR 28.00: Special Education allows for identification of children under the category of neurological impairment. This classification is defined as:

> The capacity of the nervous system is limited or impaired with difficulties exhibited in one or more of the following areas: the use of memory, the control and use of cognitive functioning, sensory and motor skills, speech, language,

> organizational skills, information processing, affect, social skills, or basic life functions. The term includes students who have received a traumatic brain injury (603 CMR § 28:02 § 7e, 2010).

Although traumatic brain injury (TBI) is recognized by federal law (IDEA, 2004), the neurological impairment classification allows for children with executive function deficits who have not experienced an apparent brain injury to be appropriately identified for special education services by inclusion of the control and use of cognitive functioning as an area of impairment. As previously defined, executive functions assist with cueing and directing cognitive abilities (McCloskey et al., 2009). Results from this survey support the inclusion of a classification like neurological impairment to facilitate more frequent executive functions assessment and intervention by school psychologists.

Conclusion

Executive functions assessment is essential in the schools due to the implication of executive functions in many childhood disabilities and the responsibility of schools to offer children comprehensive evaluations in all areas of possible disability. In addition, with increased focused on the delivery of effective interventions to children in schools, the assessment of executive functions is an important factor in identifying those interventions. Evidence-based interventions focused on students' executive deficits can change maladaptive behaviors and optimize brain functioning. The purpose of this study was to gather more information about school psychologists' perceptions, knowledge, frequency, and application in the assessment of and intervention in executive functions.

Results of the study indicate that school psychologists vary in their knowledge of executive functions, and the majority of them do not include assessment of and

intervention in executive functions in their regular practice. However, this was complicated by findings of assessment and intervention practices related to specific disabilities. School psychologists tended to rate their frequency of executive functions assessment and intervention more frequently when presented with specific disability classifications (e.g. autism or specific learning disability). In addition, most school psychologists did not rate executive functions as important or relevant in psychoeducational evaluations.

Findings also were consistent with previous studies indicating that school psychologists do not frequently use neuropsychological measures (such as the NEPSY) in their evaluations and do not receive adequate training in neuropsychological principles during graduate school. Although 80% of school psychologists reported assessing executive functions sometimes or more often, only 55% rated themselves as competent in executive functions. When applying executive functions knowledge to real-world situations, school psychologists reported using a variety of assessment and intervention strategies with children demonstrating executive function deficits. However, they did not report utilizing neuropsychological measures in assessment or self-regulation counseling programs in intervention. Finally, the results indicated that school psychologists were more likely to assess executive functions if they were a nationally certified school psychologist (NCSP), had 11 to 15 years of experience as a school psychologist, did not achieve a doctoral degree, and/or practiced in the state of Massachusetts.

Overall, the results of this study contribute to over 30 years of research about executive functions and their impact on cognitive, academic, social, emotional, and behavioral functioning. More specifically, these results support the need for more

neuropsychological training in school psychology programs, more support and training requirements from national associations such as NASP, and increased acknowledgement of executive function deficits in state and federal special education legislation. In order to best help students, school psychologists need to be more aware of and active in analyzing the educational impact of executive functions.

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Appendix A

Assessment and Intervention of Cognitive Processes Survey: Practicing School Psychologists

Preliminary Questions:
Please answer the following questions:

1) Are you currently a practicing school psychologist? Yes_____ No _____

2) Are you currently completing a school psychology internship or working as a school psychologist under emergency certification? Yes_____ No _____

If you answered "No" to all of the above questions, and you are not currently performing the duties of a school psychologist in a public school. Thanks you for your willingness to participate in this survey. However, you should know that should you choose to complete the survey, your responses will not be included in the data analyses or reporting.

Section I:
Please answer the following questions to the best of your knowledge:

3) If asked to evaluate a child with an academic problem, please indicate the top five cognitive abilities that you would want to assess. (1 = most important; 5 = least important)

1. 4.
2. 5.
3.

4) Please rank the cognitive abilities listed below in order of relevance to an evaluation of a child with an academic problem. (1 = most relevant; 9 = least relevant)

Reasoning
(verbal, and/or nonverbal and/or quantitative) _____
Visual-spatial _____
Crystallized knowledge stores _____
Processing Speed _____
Immediate Memory/Working Memory _____
Attention _____
Executive functions _____
Language _____
Retrieval from long-term storage _____

For statements 5 through 17, please circle one response based on how strongly you agree with the statement ("4") or how strongly you disagree with the statement ("0").

5) Executive functions are measured using tests of general intellectual functioning.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

6) Executive functions are considered part of the general intelligence factor, also known as *g*.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

7) Executive functions are multidimensional capacities that cue and direct our thoughts, feelings, perceptions, and actions.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

8) Executive functions are a unitary trait and can be conceptualized as the “general executor”.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

9) Deficits in executive functions related to academic skills are indicative of learning disabilities.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

10) Deficits in executive functions related to academic skills are indicative of producing disabilities.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

11) Working memory is considered an executive function.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

12) Task initiation is considered an executive function.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

13) Processing speed is considered an executive function.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

14) Cognitive flexibility is considered an executive function.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

15) Children with deficits in executive functions related to academics should qualify for services under the classification Specific Learning Disability.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

16) Children with deficits in executive functions related to academics should qualify for services under the classification Other Health Impairment.

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

17) All children with deficits in executive functions have Attention Deficit Hyperactivity Disorder (ADHD).

4	3	2	1	0
Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Please answer the following questions to the best of your knowledge:

18) How often do you include the assessment of executive functions in your psychoeducational evaluations?

4	3	2	1	0
Almost Always	Often	Sometimes	Rarely	Never

19) If you answered “0” or “1” for question #16, please indicate the reason(s) why you do not regularly include executive functions assessments in your evaluations:

Limited resources/test kits _____
Limited time/too large caseload _____
Limited training/lack of qualifications _____
Lack of usefulness/value to evaluations _____
Other: _____ _____
I don’t know _____

20) From the list below, indicate for which disability(ies) assessment of executive functions are an important portion of the evaluation:

Autism	Yes	No
Deaf-blindness	Yes	No
Deafness	Yes	No
Emotional disturbance	Yes	No
Hearing impairment	Yes	No
Intellectual disability	Yes	No
Multiple disabilities	Yes	No
Orthopedic impairment	Yes	No
Other health impairment	Yes	No
Specific learning disability	Yes	No
Speech or language impairment	Yes	No
Traumatic brain injury	Yes	No
Visual impairment	Yes	No
None	Yes	No

21) From the list below, please indicate how often you include these measures in your evaluations: (Please check one for each measure.)

	0 Never	1 Rarely	2 Sometimes	3 Often	4 Almost Always
Behavior Rating Inventory of Executive Functions (BRIEF)					
McCloskey Executive Function Scales (MEFS)					
Barkley Deficits in Executive Functioning Scale (BDEFS)					
Comprehensive Executive Function Inventory (CEFI)					
Delis-Rating of Executive Function (D-REF)					
Process Assessment of the Learning (PAL)					
Delis-Kaplan Executive Function System (DKEFS)					
Developmental Neurological Assessment (NEPSY)					
Behavioural Assessment of the Dysexecutive Syndrome (BADS)					
Wisconsin Card Sorting Test (WCST)					
Test of Everyday Attention for Children (TeaCh)					

Other (please specify):

_____

22) How often do you include specific recommendations in your psychoeducational evaluations/reevaluations to address executive functions deficits? (Circle one)

4	3	2	1	0
Almost Always	Often	Sometimes	Rarely	Never

23) If you answered "Never" or "Rarely" for question #_____, please indicate the reason(s) why you do not regularly include interventions specific to executive functions in your evaluations:

Limited resources/intervention tools _____
Limited training/lack of qualifications _____
Lack of usefulness/value to school setting _____
Lack of teacher support/fidelity _____
Other: _____ _____
I don't know _____

24) From the list below, indicate for which disability(ies) recommendations for managing executive functions deficits may be needed:

Autism	Yes	No	Maybe
Deaf-blindness	Yes	No	Maybe
Deafness	Yes	No	Maybe
Emotional disturbance	Yes	No	Maybe
Hearing impairment	Yes	No	Maybe
Intellectual disability	Yes	No	Maybe
Multiple disabilities	Yes	No	Maybe
Orthopedic impairment	Yes	No	Maybe
Other health impairment	Yes	No	Maybe
Specific learning disability	Yes	No	Maybe
Speech or language impairment	Yes	No	Maybe
Traumatic brain injury	Yes	No	Maybe
Visual impairment	Yes	No	Maybe
None	Yes	No	Maybe

25) From the list below, please indicate how often you recommend these interventions in situations where you suspect executive functions deficits: (Please check one for each intervention.)

	0 Never	1 Rarely	2 Sometimes	3 Often	4 Almost Always
Classroom environment modifications					
After school program					
Manual-based self-regulation program (e.g. SuperFlex)					
Teacher modeling					
Study skills group/course					
Self-monitoring strategies					
Time management strategies					
Verbal reprimands/punishment					
Homework assignment book/agenda					
Direct instruction					
Small group/resource room instruction					
Peer mentor/buddy					
Assistance from instructional assistant/paraprofessional					
Guided practice					
Differentiated instruction					
Positive reinforcement					
Behavior chart/reinforcement schedule					
Cognitive-Behavioral Therapy (CBT)					
Positive Behavior Support Plan					
Motivational interviewing					
Mindfulness training					

Other (please specify):_____

26) From the provided list, please indicate the types of training that you have received in the area of executive functions: (Check all that apply)

Books/Texts/Research Articles _____
Manual-based program _____
Online training/Webinar _____
District-based Inservice _____
Workshop/Conference _____
Graduate course for degree requirement _____
Graduate course beyond degree requirement _____
No formal training in executive functions _____

27) How competent do you feel in the assessment and intervention of executive functions?

4	3	2	1	0
Very Competent	Competent	Neutral	Incompetent	Very incompetent

Please indicate your responses to the following demographic questions:

28) Gender: Male _____ Female_____ Other _____

29) Ethnicity:
- African American: _____
- Asian American: _____
- Caucasian: _____
- Hispanic/Latino American _____
- Native American _____
- Pacific Islander _____
- Bi/Multi Racial _____
- Other (please specify): _____ _____

30) Age:
- 20-29 years _____
- 30-39 years _____
- 40-49 years _____
- 50-59 years _____
- 60+ years _____

31) Highest Degree Attained:
- Master's _____
- Master's Plus _____
- Education Specialist (or equivalent) _____
- Doctorate _____
- Other: _____ _____

32) At which institution did you complete your graduate training:
_____

33) Number of Practicing Years as a School Psychologist:

0-5 years _____
6-10 years _____
11-15 years _____
16-20 years _____
21 years or greater _____

34) Are you a Nationally Certified School Psychologist (NCSP)?

Yes _____ No _____

35) In which state do you currently practice?

New Jersey _____
Pennsylvania _____
Delaware _____
New York _____
Other: _____ _____

36) Are you a licensed psychologist?

Yes _____ No _____

37) Please rate the amount of training you have received in school neuropsychology:

0-5 hours _____
6-10 hours _____
11-15 hours _____
16-20 hours _____
21+ hours _____

38) Have you attained the Certificate in School Neuropsychology from the American Board of School Neuropsychology (ABSNP)?

Yes _____ No _____

You have now completed "Section 1" of this survey. Please press "Next" to continue on with "Section 2". This section will ask you to answer questions regarding several vignettes. Please remember that participation in this survey is voluntary and you may discontinue at any time**.**

Section II:
In this section, you will be asked to answer questions based on several vignettes. Please read each vignette and answer the questions that follow:

James is a 6th grade student and recently transitioned from elementary school to junior high school. James was always a good student and tended to receive A's and B's on his report card. No concerns were ever reported about his behaviors or attention in school. However, his mid-year report card showed that James was failing English, social studies, and math. Comments on his report card included: missing homework assignments, incomplete assignments, sloppy work, and poor quality of work. In discussions with James' teachers, they characterized him as an unmotivated student who could do better if he tried harder. James' grades on tests and quizzes ranged from A's to F's leading his teachers to further speculate that James' main problems are a lack of studying and a lack of interest. In order to gain more information about James' academic problems, his parents have requested a school-based evaluation to determine if James is in need of special education services.

39) Given the provided information, please indicate which assessments/procedures you would include in James' evaluation. (Please circle 'yes' or 'no' for each.)

Classroom observations	Yes	No
Parent interviews/input	Yes	No
Teacher interviews/input	Yes	No
Child interview/input	Yes	No
Review of Records	Yes	No
Social/emotional/behavioral rating scales	Yes	No
Cognitive/intellectual ability assessments	Yes	No
Academic achievement assessments	Yes	No
Functional behavior assessment (FBA)	Yes	No
Occupational therapy assessments	Yes	No
Speech/language assessments	Yes	No
Autism rating scales	Yes	No
ADHD rating scales	Yes	No
Adaptive behavior rating scales	Yes	No
Neuropsychological assessments	Yes	No
Executive functions rating scales	Yes	No
Other: _____		

Results of the evaluation found that James had an overall high average IQ (WISC-IV FSIQ of 110) and average academic achievement in all areas (reading, math, written expression, and oral language). No externalizing behaviors or internalizing emotional

problems were identified. Parent and teacher BASC-II ratings produced scores in the average range for the Hyperactivity and Inattention Subscales. In contrast, parent and teacher BRIEF ratings produced scores in the clinically significant range for the Initiate, Plan/Organize, Shift, and Monitor Scales.

40) Given these assessment results, indicate which of the following intervention levels or classifications would be best suited to address James' needs (Circle 'yes' or 'no' for each):

Tier 1 in RtI model intervention	Yes	No
Tier 2 in RtI model intervention	Yes	No
Tier 3 in RtI model intervention	Yes	No
Section 504 Accommodation Plan	Yes	No
Special education services/IEP	Yes	No
Other: _____		

41) If you indicated 'yes' for "Special education services/IEP", please indicate under which disability category(ies) James would qualify (Please check all that apply):

Autism	_____
Deaf-blindness	_____
Deafness	_____
Emotional disturbance	_____
Hearing impairment	_____
Intellectual disability	_____
Multiple disabilities	_____
Orthopedic impairment	_____
Other health impairment	_____
Specific learning disability	_____
Speech or language impairment	_____
Traumatic brain injury	_____
Visual impairment	_____

42) Given the provided information, indicate which of the following specific interventions you would be recommended for James (Circle 'yes' or 'no' for each):

Classroom environment modifications	Yes	No
Positive Behavior Support Plan	Yes	No
Behavior chart/reinforcement schedule	Yes	No
Teacher training/consultation	Yes	No
Cognitive- Behavioral Therapy (CBT)	Yes	No
Group counseling	Yes	No
Manual-based counseling program (i.e. SuperFlex)	Yes	No
Peer tutoring	Yes	No
After school program	Yes	No

Parent training	Yes	No
Applied Behavior Analysis (ABA)	Yes	No
Motivational interviewing	Yes	No
Study skills group/course	Yes	No
Other: _____		

Brittany is a 3rd grade student who has been receiving special education services since 1st grade. She is presently identified with Specific Learning Disability in the areas of reading and writing. She receives direct instruction in basic reading skills and written expression in the special education resource room. She also receives in-class supports for all other subjects while included in the general education setting. However, Brittany continues to struggle in school, particularly on tests, quizzes, and state assessments. Her teachers describe her academic approach as "scattered" and have expressed to her parents their concerns about Brittany's lack of focus and poor attention in class. Brittany's parents attribute this lack of focus to avoidance, since Brittany has a learning disability. However, her teachers are becoming increasingly concerned that Brittany's inattention involves more than a form of escape/avoidance of school work. A reevaluation was recommended by the IEP team to better understand Brittany's difficulties.

43) Given the provided information, please indicate which assessments/procedures you would include in Brittany's reevaluation? (Please circle 'yes' or 'no' for each.)

Classroom observations	Yes	No
Parent interviews/input	Yes	No
Teacher interviews/input	Yes	No
Child interview/input	Yes	No
Review of Records	Yes	No
Social/emotional/behavioral rating scales	Yes	No
Cognitive/intellectual ability assessments	Yes	No
Academic achievement assessments	Yes	No
Functional behavior assessment (FBA)	Yes	No
Occupational therapy assessments	Yes	No
Speech/language assessments	Yes	No
Autism rating scales	Yes	No
ADHD rating scales	Yes	No
Adaptive behavior rating scales	Yes	No
Neuropsychological assessments	Yes	No
Executive functions rating scales	Yes	No
Other: _____		

Results of Brittany's reevaluation demonstrated that she continues to meet the criteria as a student with a Specific Learning Disability in the areas of reading fluency and written expression. She demonstrated a pattern of strengths and weaknesses, relative to intellectual development, in standardized assessments of reading and written language. In addition, parent and teacher behavior ratings produced BASC-II scores in the significant range for Attention Problems, Hyperactivity, Learning Problems, and Conduct Problems.

Brittany performed in the extremely low range on direct assessments of sustained attention, response inhibition, cognitive flexibility, and working memory.. Further assessment of Brittany's reading skills demonstrated that she tended to struggle with switching between decoding and whole-word reading strategies while reading passages and had difficulty holding visual representations of words in working memory in order to produce correct spellings.

44) Given these assessments, please indicate under which disability category (ies) Brittany would qualify: (Please check all that apply.)

Autism	_____
Deaf-blindness	_____
Deafness	_____
Emotional disturbance	_____
Hearing impairment	_____
Intellectual disability	_____
Multiple disabilities	_____
Orthopedic impairment	_____
Other health impairment	_____
Specific learning disability	_____
Speech or language impairment	_____
Traumatic brain injury	_____
Visual impairment	_____

45) In addition to the special education services that Brittany already receives, indicate which of the following could be recommended for Brittany. (Circle 'yes' or 'no' for each.)

Classroom environment modifications	Yes	No
Positive Behavior Support Plan	Yes	No
Behavior chart/reinforcement schedule	Yes	No
Repetition and review of sight words	Yes	No
Self-monitoring strategies	Yes	No
Teacher training/consultation	Yes	No
Cognitive- Behavioral Therapy (CBT)	Yes	No
Group counseling	Yes	No
Manual-based counseling program (i.e. SuperFlex)	Yes	No
Consultation with a pediatrician/psychiatrist	Yes	No
Peer tutoring	Yes	No
After school program	Yes	No
Parent training	Yes	No
Applied Behavior Analysis (ABA)	Yes	No
Motivational interviewing	Yes	No
Pharmacological intervention	Yes	No
Other: _____		

Andrew is s 12th grade student who has been dealing with anxiety related to public speaking since he was 13 years old. However, since entering high school, Andrew's physical symptoms have worsened, and he habitually uses marijuana and possibly other drugs explaining that they help to reduce his anxiety. Andrew also frequently has angry outbursts that sometimes result in physical altercations with other students, especially when confronted about his behaviors and illegal drug use. A psychiatrist has prescribed Depakote and other anti-depressants to help stabilize his mood. During his senior year, Andrew frequently has been absent from school and is failing many of his classes. Andrew had previously hoped to go to college; however, his parents are worried that he may not graduate this school year. An evaluation was recommended in order to determine Andrew's social/emotional/behavioral needs and to recommend appropriate school-based interventions.

46) Given the information provided, please indicate which assessments/procedures you would include in Andrew's evaluation? (Please circle 'yes' or 'no' for each.)

Classroom observations	Yes	No
Parent interviews/input	Yes	No
Teacher interview/input	Yes	No
Child interview/input	Yes	No
Review of Records	Yes	No
Social/emotional/behavioral rating scales	Yes	No
Cognitive/intellectual ability assessments	Yes	No
Academic achievement assessments	Yes	No
Functional behavior assessment (FBA)	Yes	No
Occupational therapy assessments	Yes	No
Speech/language assessments	Yes	No
Autism rating scales	Yes	No
ADHD rating scales	Yes	No
Adaptive behavior rating scales	Yes	No
Neuropsychological assessments	Yes	No
Executive functions rating scales	Yes	No
Continuous Performance Test	Yes	No
Other: _____		

Results of Andrew's evaluation indicated that an overall IQ in the superior range (WAIS-IV FSIQ = 132). In addition, he demonstrated high average academic performances in the areas of reading, math, oral language, and written expression. However, parent and teacher behavior ratings produced BASC-II composite scores in the significant range for Externalizing Problems and Internalizing Problems (specifically Anxiety). With self-report measures, Andrew's BASC-II ratings produced composite scores in the significant range for School Problems (feelings about teachers and school) and Internalizing Problems (Anxiety). Parent and teacher BRIEF ratings produced scores in the clinically significant range for the Initiate and Plan/Organize Scales. Throughout assessments, Andrew demonstrated difficulties with sustained attention and following routines.

47) Given these assessment results, indicate which of the following intervention levels or classifications would be best suited to address Andrew's needs (Circle 'yes' or 'no' for each):

Tier 1 in RtI model intervention	Yes	No
Tier 2 in RtI model intervention	Yes	No
Tier 3 in RtI model intervention	Yes	No
Section 504 Accommodation Plan	Yes	No
Special education services/IEP	Yes	No
None of the above	Yes	No
Other: _____		

48) If you indicated 'yes' for "Special education services/IEP", please indicate under which disability category(ies) Andrew would qualify: (Please check all that apply.)

Autism	_____
Deaf-blindness	_____
Deafness	_____
Emotional disturbance	_____
Hearing impairment	_____
Intellectual disability	_____
Multiple disabilities	_____
Orthopedic impairment	_____
Other health impairment	_____
Specific learning disability	_____
Speech or language impairment	_____
Traumatic brain injury	_____
Visual impairment	_____

49) Given the provided information, indicate which of the following specific interventions you would be recommended for Andrew. (Circle 'yes' or 'no' for each.)

Classroom environment modifications	Yes	No
Positive Behavior Support Plan	Yes	No
Behavior chart/reinforcement schedule	Yes	No
Teacher training/consultation	Yes	No
Cognitive- Behavioral Therapy (CBT)	Yes	No
Group counseling	Yes	No
Manual-based counseling program (i.e. SuperFlex)	Yes	No
Peer tutoring	Yes	No
After school program	Yes	No
Parent training	Yes	No
Applied Behavior Analysis (ABA)	Yes	No
Motivational interviewing	Yes	No
Study skills group/course	Yes	No
Self-monitoring strategies	Yes	No
Consultation with a pediatrician/psychiatrist	Yes	No
Pharmacological intervention	Yes	No
Other: _____		

Thank you for your participation in this research project. Your responses are greatly appreciated!

Appendix B

Dear Colleague,

You are being asked to participate in a research study exploring the self-perceived knowledge, competency, and frequency of school psychologists in the assessment and interventions of cognitive processes related to learning and behavior. This survey is being conducted for the purpose of the completion of doctoral dissertation at the Philadelphia College of Osteopathic Medicine (PCOM). In addition to answering several demographic questions, you will be asked to rate your knowledge and competence as well as frequency of practice related to identifying deficits in multiple cognitive processes. This survey will take approximately 30 minutes to complete.

There are minimal risks associated with this study concerning asking respondents for their self-perceived competency levels. Potential benefits include increased knowledge about school psychologists' assessment and intervention practices in the educational setting. Documentation including correct answering and best practices to each question and a summary of the survey findings are available upon request. These documents can be sent to the participants after the data collection is complete.

Your participation in completely voluntary and consent will be assumed if questions have been answered and submitted. You may withdraw from the study at any time, without penalty. The results of the survey will be kept confidential. This data will be kept anonymous by having no personal identifiers used. Further, any contact information submitted for the optional raffle drawing will not be linked to the survey data.

Thank you in advance for your participation. Should you have any questions, or if you would like the results, please contact Meghan Garrett at PCOM at meghanga@pcom.edu. You may also contact the dissertation chair for this study, George McCloskey, Ph.D. at georgemcc@pcom.edu or 215-871-6563.

Sincerely,

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