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The Consistency of Ratings on the Cab-T Executive Functioning Scale as Compared to the Brief

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THE CONSISTENCY OF RATINGS ON THE CAB-T EXECUTIVE FUNCTIONING SCALE AS COMPARED TO THE BRIEF

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THE CONSISTENCY OF RATINGS ON THE CAB-T EXECUTIVE FUNCTIONING SCALE AS COMPARED TO THE BRIEF

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Executive functioning is an umbrella term used to describe abilities that include self-monitoring, goal-setting, planning, organization, attention, and working memory. Broadband behavior rating scales are commonly used by school psychologists and the instruments often now include an executive functioning scale. It is unknown, however, how these scales, based on a few items, compare to more extensive rating scales that solely measure executive functioning. The current study examined the overall consistency between the executive functioning scale on one broadband instrument to another instrument that assesses multiple areas of executive functioning by having teachers complete both instruments at the same point in time. The comparisons revealed statistically significant correlations, but significantly different mean scores between the executive functioning *CAB-T* score and the overall *BRIEF* score. Furthermore, classification consistency (i.e., scores from the two scales are both in the average range or clinically significant range) only occurred approximately two-thirds of the time. Thus, concerns were raised about the use of the scale from the broadband instrument as a general measure of executive functioning.

Introduction

Executive functioning is defined as the abilities needed to self-regulate and self-monitor goal-directed behavior in everyday life using past knowledge and experiences (Kaufman, 2010; Moran & Gardner, 2007). It is an umbrella term that includes abilities such as goal-setting, planning, organization, and using self-restraint to carry out goals (Gioia, Isquith, Guy, & Kenworthy, 2000; Kaufman, 2010). Interest in executive functioning has become heightened over the past two decades, most likely due to the increasing number of individuals that are being diagnosed with executive functioning impairments, such as Attention Deficit Hyperactivity Disorder (ADHD) and Autism Spectrum Disorder (ASD), as well as its importance to everyday human functioning (Blijd-Hoogewys, Bezemer, & van Geert, 2014; Kaufman, 2010).

Despite the growing attention and research on executive functioning, there is little consensus on how to specifically define the construct (Borkowski & Burke, 1996). According to Bernstein and Waber (2007), the only consistency within the definition of executive functioning is the inconsistency. Twenty years ago, Borkowski and Burke (1996) noted that research did not provide a definition accepted across the fields of psychology, neuropsychology, and education. Even now, the definition of executive functioning is still challenging to operationalize. Furthermore, the behavioral manifestations of executive functioning abilities change at different ages and in different settings, which makes narrowing down a definition that is suitable to all challenging (Fischer & Daley, 2007). The studies above indicate that the construct of executive functioning is complicated and, although new research information accumulates, a specific universal definition does not appear likely. Individual components of executive

functioning, however, result in more agreement amongst researchers and include self-monitoring, goal-setting, planning, organization, attention, and working memory (Barkley, 1996; Hayes, Gifford, & Ruckstuhl, 1996; Kaufman, 2010; Moran & Gardner, 2007).

The following literature review initially provides additional information on executive functioning including theoretical perspectives, strands, and associated skills. Next, a brief review of executive dysfunction and its association with developmental disabilities are provided. To establish a context for this topic's importance to educational settings, a review of the role executive functioning as related to academic performance in reading, math, and written expression is discussed. The assessment of executive functioning poses challenges and the next sections will provide an overview of neuropsychological assessment along with the use of behavior rating scales. The literature review concludes with a rationale for the research questions that direct the current investigation.

This project will evaluate how an executive functioning scale from a broadband behavior rating scale measures the construct as compared to a narrow band scale that assesses executive functioning. The different rating scales will be completed by teachers filling out both rating scales on a student, with a diagnosis or Tier 3 intervention, at the same point in time. According to Sullivan & Riccio (2006), participants with ADHD had significantly higher deficits in executive function than those with no diagnosis. By using atypical students, executive functioning deficits would be easier to detect. How those scores compare to each other is important information for school psychologists. If one of these assessments results in significantly different scores, then the results could lead to a

different diagnoses/conclusion regarding the level of an individual's executive functioning skills. However, if students' executive functioning can be adequately measured using a broadband instrument, then school psychologists will have more information about a variety of behaviors for student interventions and behavior management.

The broadband instrument examined in this study will be the teacher version of the *Clinical Assessment of Behavior* (*CAB-T*, Bracken & Keith, 2004) and its results will be compared to the results of a narrow band executive functioning rating scale, the *Behavior Rating Inventory of Executive Function* (*BRIEF*, Gioia et al., 2000). Specifically, this study will examine how strong of a correlation exists between the executive functioning scale on the *CAB-T* and the overall composite score on the *BRIEF*, which clinical scale on the *BRIEF* results in the highest correlation with executive functioning on the *CAB-T*, the classification consistency between the *CAB-T* and overall composite *BRIEF* scores, and the classification consistency between the *CAB-T* and the *BRIEF* clinical scale with the highest correlation with the *CAB-T*. As part of the analysis of classification consistency, the percentage of times each pair of scores are both in the average range or clinically significant range will be determined.

Literature Review

Part of what makes executive functioning such a complicated construct is that there are multiple perspectives of executive functioning, varying on different theoretical orientations. Furthermore, there are two strands or branches of executive functioning and within those strands are numerous skills. Those perspectives will be reviewed along with a description of the strands and skills that comprise executive functioning. Figure 1 represents executive functioning broken down into strands, and finally skills.

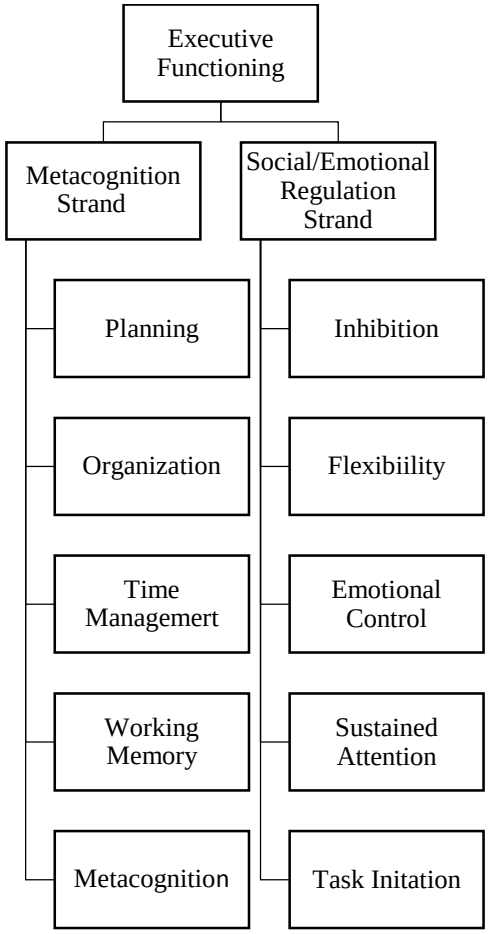

Figure 1. Executive functioning strands and skills as conceptualized by Dawson and Guare (2010) and Kaufman (2010).

Perspectives of Executive Functioning

Along with the extensive number of definitions of executive functioning, there are many perspectives on what controls executive functioning, how it should be measured, and what needs to occur next in research. The main perspectives are from multiple intelligence theory, neuropsychology, and behavior and environmental psychology. While there is some overlap among the perspectives, each emphasizes different approaches to defining, measuring, and researching executive functioning.

Moran and Gardner (2007) have developed a multiple intelligence perspective of executive functioning that focuses on interpersonal intelligence. Interpersonal intelligence, according to Moran and Gardner (2007), is learning by interacting with others. Executive functioning is developed by using situational cues and past experiences from interpersonal relationships. Other components of the multiple intelligence perspective include being mentally and behaviorally flexible and having the ability to control behavior to become prepared for everyday situations (Moran & Gardner, 2007).

Within the environmental perspective, it is believed that children are not born with executive functioning skills but they all have the potential to develop them (Bagby, Barnard-Brak, Sulak, Jones, & Walter, 2012). The relationships that the child develops determine if the skills are adequately developed or if there are deficits. This perspective indicates that the environment and personal relationships will promote or disrupt "brain architecture." An example of a study supporting this view is research that demonstrated teachers' ratings of executive functioning skills differed according to the student's learning environment. Some school environments, like Montessori, appear to help

students develop better executive functioning skills than other school settings, such as teacher directed and child centered (Bagby et al., 2012).

A behavioral approach also studies the interaction between a person and his or her current environment (Hayes et al., 1996). However, Hayes et al. (1996) indicate that behaviorists concentrate on the measures that people use to assess executive functioning. Instead of focusing on the specific label used to define executive functioning, the focus is on the assessment methods measuring the actual behaviors that occur with these labels. The behavioral approach recognizes self-regulation, set-maintenance, inhibition, cognitive flexibility, planning, prioritizing, and organizing time and space as aspects of executive functioning.

Within neuropsychology, executive functioning is defined as a process that allows humans to make decisions and to engage in focused, goal-directed, and future-directed behavior (Suchy, 2009). A prominent neuropsychology model is Stuss and Benson's tripartite model where there are three systems that interact to monitor attention and executive functions (as cited in Chan, Shum, Toulopoulou, & Chen, 2008). Damage to these systems will result in loss of consciousness, distraction to external stimuli, inattention, awareness, and the goal avoidance behaviors (Chan et al., 2008). The perspective of neuropsychology is that executive functions develop within the frontal lobe and deficits only occur when there is damage to the brain (Suchy, 2009). In the past, frontal lobe deficits primarily were connected with people diagnosed with Traumatic Brain Injury (TBI). It was thought that brain lesions that developed after an injury affected goal-orientated behaviors (Denckla, 1996; Suchy, 2009). More recently, however, executive functioning deficits have been affiliated with people that are

diagnosed with disorders such as ADHD and ASD, where brain lesions are not a cause of executive functioning deficits.

Unlike other perspectives, neuropsychologists believe complex skills should not be used to define executive functioning (Suchy, 2009). For example, planning, reasoning, problem solving, and other related terms are skills that a person can learn, practice, and improve. In referring to executive functioning as EF, Suchy (2009) stated that "EF, in contrast, does not come on line in situations in which behavior can rely on learned, routine, or automatic responses" (p. 110). Using complex skills as labels may not measure executive functioning but could indicate a situation that has become automatic and less reflective of the actual ability (Suchy, 2009). Instead of using complex skills, neuropsychologists use processes to identify executive functioning that can be broken down with cognitive tasks. These processes, such as focusing attention, working memory, discrepancy detection, and sequencing, are different from complex skills because they cannot be susceptible to prior learning. Cognitive methods, such as functional neuroimaging, allow validation of neurocognitive processes (Suchy, 2009).

Strands of Executive Functioning

Despite multiple theoretical perspective of executive functioning, it is generally accepted that executive functioning can be divided into two strands, a metacognitive strand and a social/emotion regulation strand (Kaufman, 2010). The metacognitive strand encompasses the cognitive and academic elements of executive functioning. These components are the foundation for the comprehension of information, as well as planning, starting, and completing tasks.

The metacognitive strand includes skills that enable people to purposely attend to content that is presented. In order to understand the content, a person selects strategies that help recall information (Kaufman, 2010). Goals are identified, planning and organization occurs, and the ability to shift within tasks helps complete the original goal (Gioia et al., 2000). Time management is needed in order to prioritize the steps required to accomplish a task.

In the social/emotional strand, the executive functioning skills that are needed include impulse control, emotional control, and adaptability (Kaufman, 2010). These skills help in social circumstances and are necessary for what society finds as appropriate behavior. Impulse control or response inhibition is the ability to stop angry, destructive, and self-injurious reactions to environmental stimuli (Kaufman, 2010). Emotional control is the self-management of emotions. Although it does not prevent emotions from occurring, it does determine how they are expressed (Barkley, 1997; Kaufman, 2010). The last skill in the social/emotional strand is adaptability, which is the capability to adapt to changes in routine and cope with everyday changes.

Skills of Executive Functioning

Within both strands of executive functioning, there are skills that are defined as the "specific effects" of executive functioning (Nigg et al., 2005). In an overview of executive functioning, Dawson and Guare (2010) divide ten skills into two larger groups. Dawson and Guare's first group is based on goal-setting skills including inhibition, flexibility, emotional control, sustained attention, and task initiation. The second group is referred to as thinking skills or how to read a goal, and include planning, organization,

time management, working memory, and metacognition. These skills will be described within the context of students in schools.

Executive functioning regulates goal-setting behavior (Moran & Gardner, 2007). The definition of goal-setting is the ability to determine a desire for the future, the necessary steps that it takes to succeed, and then to act on those steps (Kaufman, 2010). Locke and Latham (2002) reported that goals affect performance through four mechanisms. Goals act as a direction function; they direct attention and effort toward a specific activity. They also "energize" the process when higher goals are set. Goals also affect participant persistence and indirectly affect action by leading the discovery of knowledge (Locke & Latham, 2002).

Inhibition is having the ability to stop a behavior at the appropriate time (Roth, Isquith, & Gioia, 2005). Students with the ability to inhibit can resist, or not act on, an impulse. When students display a developmentally inappropriate lack of inhibition, personal safety and potential harm to others are concerns because individuals/students are likely to engage in risky behaviors without thinking of the consequences. Dawson and Guare (2010) explain that students that are capable of inhibition have time to evaluate a situation and determine how behavior might impact it.

An additional skill is flexibility and although Roth et al. (2005) define it as one's ability to move freely from one situation to another, Kaufman (2010) explains that flexibility can be thought of as an individual's capacity for adaptability. Both terms, flexibility and adaptability are referencing the same skills needed to perform successfully within a classroom. Sansosti, Powell-Smith, and Cowan (2010) explain that children who have deficits in flexibility often have restricted interests, engage in repetitive behaviors,

and are resistant to change. For example, a child with flexibility deficits might be adamant that a kitchen pot can only be used for cooking purposes and not as a drum to create sounds (Sansosti et al., 2010.)

Emotional control is defined as the ability to manage emotions in order to achieve goals, complex tasks, or control and direct behavior (Dawson & Guare, 2010). They also explain that there is a developmentally inappropriate lack of emotional control is a student may have frequent tantrums, overacts to small problems, exhibits frequent mood changes, become overly anxious, has a quick temper, and/or be slow to recover from disappointments. School psychologists may observe lack of emotional control through behaviors such as a student becoming visibly upset or easily frustrated when tasks or items become challenging, displaying a range of emotions in a short period of time, and making negative statements during testing (Dawson & Guare, 2010).

Sustained attention is the ability to attend to a task or situation despite distractions or boredom at an age appropriate level (Dawson & Guare, 2010). Barkley (1997) stated that sustained attention is affected when internal and external distractors disrupt a task. The distractor can then lead to the decrease in other executive functioning skills. In order to maintain performance, a student has to sustain attention.

Task initiation is the ability to begin a task in a timely matter and without procrastination (Dawson & Guare, 2010). Gioia et al. (2000) indicated that students with poor initiation skills often want to be successful with a task but they cannot get started. It does not reflect defiance or disinterest in an activity or task.

Thinking skills, at an age appropriate level, are often used to select and achieve goals and include planning, organization, time management, working memory and

metacognition (Dawson & Guare 2010). Planning involves envisioning or developing goals and forming a series of steps that it requires to complete the goal (Gioia et al., 2000). According to Borkowski and Burke (1996), most planning requires decision-making, self-regulation, and action. Planning also requires setting priorities for a task or activity (Dawson & Guare, 2010.)

Organization skills encompass having the ability to arrange and sort information (Meltzer, 2007). It requires maintaining systems at the appropriate developmental stage and keeping track of information or materials, such as lecture notes and homework assignments (Dawson & Guare, 2010). Langberg, Epstein, Urbanowicz, Simon, and Graham (2008) also indicated that deficits in organization skills may contribute to losing assignments, misplacing completed work, and difficulty planning for tests.

Time management is the ability to determine how much time one has, how to distribute it amongst tasks, and the capability to stay within time limits and deadlines. It also involves the realization that time is important (Dawson & Guare, 2010). Working memory is the ability to mentally hold information for the purpose of using it to finish a task (Gioia et al., 2000). An important component of working memory is the ability to stay focused and pay attention to the task. In addition, working memory includes the ability to utilize past learning or experiences when in certain situations or to plan for the future (Dawson & Guare, 2010).

Metacognition is the knowledge of oneself for self-assessment and learning for life (Gregory & Chapman, 2012). It is the ability to take a step back and evaluate oneself in a situation. Dawson and Guare (2010) stated that it includes self-monitoring and asking oneself, “How am I doing?” or “How did I do?”

Executive Dysfunctions and Developmental Disabilities

While executive functions are higher-order cognitive processes that are associated with the prefrontal cortex (Happé, Booth, Charlton, & Hughes, 2006), executive dysfunction is a general term used to describe deficits in executive functioning (Meltzer, 2007). Research in the 1980s and 1990s began to show a relationship between certain developmental disabilities and executive dysfunctions. In the late 1980s, deficits in executive functioning in persons with ADHD were beginning to be discussed (Barkley, 2014). Meltzer (2007) noted that research by Harvey Levin in the 1990s demonstrated that children with Traumatic Brain Injury (TBI) showed similar deficits and established a link between ADHD and frontal lobe injury. Since then, additional research has reported links between executive dysfunctions and disorders such as TBI and Major Depressive Disorder (Snyder, 2013), Learning Disabilities (Meltzer, 2007), Schizophrenia and Obsessive-Compulsive Disorder (Spitznagel & Suhr, 2002), and Bipolar Disorder (Clark, Sarna, & Goodwin, 2014). According to Meltzer (2007), disabilities that involve deficits in executive functioning may seem similar but the executive dysfunctions manifest differently in distinct disorders. Executive dysfunctions will be described in more detail for two common disorders, ADHD and ASD.

ADHD can be diagnosed when a person has at least six symptoms that fall under the inattention, hyperactivity-impulsive, or combined inattention and hyperactivity categories (American Psychiatric Association [APA], 2013). A listing of ADHD symptoms reveals remarkable parallels to executive dysfunctions. Inattention symptoms include the following: fails to give close attention, makes careless mistakes, difficulty sustaining attention, does not appear to listen, struggles to follow directions, poor

organization, loses things, easily distracted, and forgetful in daily activities. Hyperactive-impulsive symptoms include the following: fidgets, difficulty remaining seated, restlessness, talks excessively, blurts out, and difficulty waiting or taking turns. Those diagnostic characteristics are closely related to deficits in executive functions such as inhibition, sustained attention, planning, organization, and time management (APA, 2013).

Research studies have demonstrated the link between executive dysfunctions and ADHD characteristics. Happé et al. (2006) noted that when focusing on tasks that involve inhibition, flexibility, and planning, children with ADHD showed executive dysfunction in planning and inhibition while typically developing children in a control group did not have the same deficits. A study conducted by Pliszka (2006) found that functional magnetic resolution imaging (fMRI) did not detect activity in the left prefrontal and anterior cingulate cortex of the brain for children diagnosed with ADHD while completing inhibition tasks. ADHD is a disorder where it is clear that executive dysfunctions play a role in the functioning and academic outcomes in children (Biederman et al., 2004).

Children with ASD have also been identified as having executive dysfunctions (Dawson & Guare, 2010). Diagnostic characteristics include deficits with reciprocal social communication, social interaction, and restricted, repetitive patterns of behavior, interests, or activities (APA, 2013). Blijd-Hoogewys et al. (2014) noted that people diagnosed with ASD often have executive dysfunctions in flexibility, planning/organization, initiation, and working memory. Geurts, Verté, Oosterlaan, Roeyers, and Sergeant (2004) concluded that people diagnosed with higher functioning

autism demonstrated deficits in all executive functioning domains except working memory. A study by Corbett, Constantine, Hendren, Rocke, and Ozonoff (2009) indicated that children ages 7-12 years old with ASD show significant deficits in awareness, inhibition, flexibility/switching, and working memory. Thus, these studies illustrate examples of the types of executive functioning research that has been conducted with children with developmental disabilities.

Academic Performance

Meltzer (2007) described the 21st century classroom as a place that relies on rapid communication, technology, efficient media, and fast access to extensive sources of information. As such, it has become evident the importance of teaching executive functioning skills related to skills that include prioritizing, self-editing, organizing, and planning. Dawson and Guare (2010) advocate teaching executive functioning skills in the classroom, including managing assignments, homework, and materials; time management; behavior management; and promoting problem solving and independence.

Executive functioning skills are also observed within academic subjects such as math, reading, and writing. Children of lower mathematical ability struggle with tasks that require maintaining information in working memory (Bull & Scerif, 2001). Executive functioning skills, such as planning and working memory, were reported to be better predictors of reading comprehension, even when controlling for commonly accepted contributors such as attention, decoding skills, fluency, and vocabulary (Sesma, Mahone, Levine, Eason, & Cutting, 2009). Within the subject of writing, executive functioning skills such as initiation, self-regulation, and planning are necessary (McCloskey & Perkins, 2012). Students struggling with executive functioning will most

likely have difficulties with planning and organizing thoughts about what to write as well as have difficulty judging the adequacy of a written product and/or recognizing when text needs to be revised (McCloskey & Perkins, 2012).

Students with high executive functioning skills who struggle academically are able to compensate for, or mask, their deficits (McCloskey & Perkins, 2012). These students tend to use high frequency or easily spelled words to hide deficits. McCloskey and Perkins go on to describe how students with high executive functioning skills will tend to produce writing samples with a high word count but low quality of the content and a limited range of words. The authors also discussed that math students with high executive functioning skills are able to store and retrieve algorithms and procedures despite the lack of understanding concepts. Furthermore, McCloskey and Perkins contends there are students that have learning disabilities but because they show developed executive functioning skills, they usually are not referred for special education assessments because their effective use of executive functions helps them maintain acceptable expectations in the classroom.

Deficits in executive functioning are found in individuals with various disorders that impair functioning in a variety of domains including social, behavioral, and academic. Given that executive skills can be taught or enhanced, it is important to be able to accurately assess executive functioning deficits.

Neuropsychological Assessment of Executive Functioning

Due to the negative impact that executive dysfunction can have on everyday performance, researchers have emphasized the importance of measuring and evaluating executive functioning skills (Manchester, Priestley, & Jackson, 2004). However, methods

for assessing executive functioning vary and have their limitations. Marshall (2012) thought the perfect executive functioning test would have four major elements that include a "perfect, and known correspondence to everyday life impairment; a strong proven link to operation of one particular brain region or system; well understood psychometric dynamics; and comprehensive theory as to what the test measures" (p. 358). Unfortunately, Marshall (2012) explained that currently no test has all of these characteristics.

Early research on the assessment of executive functioning was within the realm of neuropsychology. Marshall (2012) listed 12 different tests, such as the Wisconsin Card Sorting Test and the Tower of London, which neuropsychologists have used to measure executive functioning. The tests, given in controlled clinical settings, are thought to provide fairly accurate results due to the strategic, problem solving, and time components of the tests (MacAllister et al., 2012). However, due to the high level of expertise required to interpret the test results, the neuropsychological tests are not practical for nonclinical settings, such as schools. The primary criticism of the neuropsychological methods of assessing executive functioning, however, is that such test results have limited generalizability to real world situations (Clark, Prior, & Kinsella, 2000). That is, performance on one or more of those tests does not translate to performance in other environments, such as the school setting.

Assessment Using Behavior Rating Scales

Due to the limitations of clinical neuropsychological assessments of executive functioning, behavior rating scales have been developed to assess the skills in a more practical manner. Behavior ratings scales require a third party (e.g., parent, teacher) to

provide judgments on the frequency or severity of specific behaviors exhibited by the student. Behavior rating scales can be considered broadband, meaning they assess a broad range of psychological constructs, or they can be narrow band, meaning they focus on one particular construct. In general, behavior rating scales have many strengths and weaknesses (Crooks, Hylton, Dickerson, Clair, & Sinha, 2015; Merrell, 2008). Strengths of behavior rating scales include being quick and easy to administer and score, adaptable for a variety of age ranges, the provision of a variety of validity indices, and the ability to provide information on a wide range of behaviors. There are, of course, limitations to behavior rating scales too. The informant must be familiar with the student being rated. Behavior rating scales typically measure a limited number of domains (Crooks et al., 2015). In addition, questions sometimes require clarification or need to be read aloud to informants.

School psychologists frequently use broadband behavior rating scales to assess social-emotional skills of students (Shapiro & Heick, 2004). Broadband instruments typically contain scales that assess a wide range of school-related problems and behaviors, such as hyperactivity, aggression, and withdrawn behaviors. Some of the broadband behavior rating scales contain scales that purport to assess executive functioning. Examples of such instruments include the *Conners-3* (Conners, 2008) and the *Clinical Assessment of Behavior* (*CAB*, Bracken & Keith, 2004). However, given that multiple constructs are assessed on a broadband behavior rating scale, each construct is assessed with only a few items. For example, the teacher version of the *CAB* has only 13 items that contribute to a student's executive functioning score.

An early narrowband behavior rating scale developed to assess executive functioning is the *Behavior Rating Inventory of Executive Function* (*BRIEF*, Gioia et al., 2000). The *BRIEF* is for ages 5-18 and has 86 items that assess impairments of executive functioning (Gioia et al., 2000). The *BRIEF* uses parent or teacher input to evaluate a wide array of executive functioning skills. Specifically, the *BRIEF* assesses eight domains: monitor, organization of material, plan/organize, working memory, initiate, emotional control, shift, and inhibit. These eight domains are divided into two composite areas, Meta-Cognition and Behavioral Regulation. Initiate, Working memory, Plan/Organize, Organization of Materials, and Monitor make up the Metacognition Index. Inhibit, Shift, and Emotional Control make up the Behavioral Regulation Index. The *BRIEF* also provides an overall executive functioning score called Global Executive Composite which combine all eight domains. T scores are used to provide norm-referenced results. Lower scores suggest higher levels of executive dysfunction.

Numerous studies have included the *BRIEF* to examine a broad range of topics. For example, several studies have used the *BRIEF* to look at executive functioning characteristics of children with specific disorders such as ADHD (e.g., Langberg, Dvorsky, & Evans, 2013), autism spectrum disorders (e.g., Akbar, Loomis, & Paul, 2013; Blijd-Hoogewys et al., 2014), and cerebral palsy (e.g., Whittingham, Bodimeade, Lloyd, & Boyd, 2014). Other studies have evaluated the instrument after translations into other languages (e.g., Spyridon, & Olga, 2009; Qian & Wang, 2009). A few studies have used the *BRIEF* to establish concurrent validity for other measures (e.g., Reddy, Newman, Pedigo, & Scott, 2010). However, an EBSCOhost database search on March 5, 2016

revealed no studies that compared the *BRIEF* to an executive functioning scale on a broadband behavior rating scale.

Purpose

While executive functioning is generally deemed an important area of study and relevant to the functioning of students in schools, the best method for assessing the construct remains questionable. Clearly, there is a need for more research on how executive functioning is accurately measured (MacAllister et al., 2012). School psychologists frequently use broadband behavior rating scales, but would an executive functioning score from those instruments, based on a small number of items, be adequate for assessing the construct? The general purpose of the current study is to better understand the characteristics of behavior rating scales that assess executive functioning, specifically their psychometric properties.

This project seeks to evaluate how consistently an executive functioning scale from a broadband behavior rating scale measures the construct as compared to a narrow band scale that assesses executive functioning. To conduct such research, teachers will be asked to complete the two executive functioning scales consecutively on a student to assess the consistency of scores. In order to get a wide range of scores, teachers were asked to think of students with disabilities or those receiving specialized interventions for academic or behavior problems, called Tier 3. The consistency or inconsistency of scores across rating scales is useful information for school psychologists. That is, if one instrument results in scores significantly higher or lower than another, then caution is warranted when interpreting the results. On the other hand, if students' executive

functioning can be adequately measured using a broadband instrument commonly used in evaluations, then that is also important practical information for school psychologists.

The broadband instrument examined in this study will be the *CAB-T* (Bracken & Keith, 2004) and its results will be compared to the results of a narrow band executive functioning rating scale, the *BRIEF* (Gioia et al., 2000). The primary research question that will be addressed through this study is, does the executive functioning scale on a broadband behavior rating scale (i.e., the *CAB-T*) adequately assess the construct as compared to the results of a narrow band rating scale that focuses solely on executive functioning (i.e., the *BRIEF*)? Specific questions are:

1. How strong of a correlation exists between the executive functioning scale on the *CAB-T* and the overall score on the *BRIEF*?

2. What clinical scale on the *BRIEF* results in the highest correlation with the executive functioning scale on the *CAB-T*? It was judged that the items on the *CAB-T* EF scales most closely resembled the *BRIEF* clinical scales of Inhibit, Plan/Organize, and Working Memory after an informal analysis of the 13 items on the *CAB-T* EF scale. Is the *CAB-T* EF scale most highly correlated with one of those three scales?

3. How consistent are the *CAB-T* and overall composite *BRIEF* scores in terms of comparability of T scores and classification consistency? Similarly, the same consistency analysis will be used with the clinical scale with the highest correlation with the *CAB-T* EF scale. Using the analysis methods of Myers (2013), comparability of T scores will be determined statistically through *t*-tests and classification consistency will be evaluated by determining the percent of times the *CAB-T* score and the *BRIEF* overall score are both in the same general range of functioning (i.e., average range vs. clinically significant).

Clinical significance will be defined as greater than or equal to 1.5 standard deviations from the mean.

Method

Participants

Participants for the study are a convenience sample of teachers from school districts in western Kentucky (District 1), southern Illinois (District 2 district), and northern Tennessee (District 3). For the 2015-2016 school year, within District 1 schools, there are three elementary schools, one middle school, one high school, and one alternative school and the district serves approximately 3,057 students. According to the school district's website, District 1's student population includes approximately 79% Caucasian, 12% African American, .04% Hispanic, .01% Native Hawaiian/pacific Islander, .01% Asian, and .01% American Indian. District 1 has approximately 16% of its students receiving special education services and 64% of its students are on free or reduced lunch.

District 2 district serves approximately 386 students in a K-12 facility. For the 2014-2015 school year, District 2 had approximately 73.5% Caucasian, 20.7% African American, 0.7% Hispanic, 0.2% Native American/Pacific Islander, and 0.5% American Indian students. The majority of students in the district (69%) are on free and reduced lunch. District 2 district has approximately 13.1% of its students receiving special education services.

District 3 contains 12 elementary schools, three middle schools, five high schools, and one alternative school and serves approximately 11,636 students as of 2015. Approximately 75.5% of the students are Caucasian, 11.3% African American, and 12.1% Hispanic or Latino. District 3 has 15.3% of its students classified with special education disabilities and 51.6% are receiving free and reduced lunch.

Attempts were made to obtain ratings from 100 teachers who taught across all educational grade levels. Several teachers, particularly from District 3 (n = 27), chose not to participate. Two teachers' ratings were excluded because of incomplete completion of the rating scales. This left 65 participants for this study that were comprised of teachers from elementary, middle, and high school. Out of the 65 participants, 17 were from District 1, 25 from District 2, and 23 from District 3. The years of experience for teachers ranged from 1 year to 34 years, with a mean of 12.0 years (SD = 9.6 years). Rated children were defined as children who were receiving Tier 3 interventions or who were identified with a disability. Out of the 65 students that were assessed, there were 48 boys (73.8%) and 17 girls (26.2%), with an overall mean age of 10.3 years. As can be seen in Table 1, the mean ages and age ranges of the boys and girls were similar. Almost half of the students rated were elementary students (n = 31), while 18 were in middle school and 16 were in high school. Within the sample, seven different educational disabilities were represented: ASD, Intellectual Disability, Learning Disability, Other Health Impaired, Emotional Behavior Disorder, Language Impaired, and Developmental Delay (see Table 2). Of the students being rated, 49% were in Tier 3 intervention and were not classified as having a disability.

Instruments

The Behavior Rating Inventory of Executive Function. The *Behavior Rating Inventory of Executive Function* (*BRIEF*, Gioia et al., 2000) is a narrow band instrument developed to assess executive functioning behaviors in the school and home setting. The *BRIEF* was included in this study because it is a popular behavior rating scale used to

Table 1

Age in Years of Students

Students	Mean	*SD*	Range
Boys	10.2	2.9	6.0 – 16.4
Girls	10.5	3.5	6.4 – 15.8
Total	10.3	3.1	6.0 – 16.4

Table 2

Disability Representation of Students

Disability	Frequency	Percent
None - only Tier 3	32	49.2
Learning Disability	10	15.4
Autism Spectrum Disorder	8	12.3
Developmental Delay	6	9.2
Other Health Impaired	4	6.2
Intellectual Disability	3	4.6
Emotional Behavior Disorder	1	1.5
Language Impaired	1	1.5

Note. Tier 3 is defined as having specialized academic and/or behavioral interventions along with general education instruction.

assess executive functioning (Merrell, 2008). In developing the items on the *BRIEF*, Gioia et al. (2000) relied on literature on executive function development in children. In addition, neuropsychology colleagues were interviewed "about their use of the term 'executive function' and what domains this term might encompass" (Gioia et al., 2000, p. 35). The theoretical model used to develop the *BRIEF* is not explicitly stated; however, the authors did cite Stuss and Benson's tripartite model when describing various executive function skills.

According to the test manual, Gioia et al. (2000) wanted the *BRIEF* to yield clinically useful information about commonly agreed upon domains of EF. The measure needed to exhibit properties of reliability and validity, internally consistent and stable, and yield consistent profiles between observers or raters. The instrument was also created in a way that would correlate highly with other measures of cognitive function and measures of attention, behavioral control, problem solving, and learning (Gioia et al., 2000). Furthermore, it was designed specifically for the student population.

The teacher version of the *BRIEF* is used in this study and, hence, will be described in this section. The *BRIEF* consists of 86 items that measure eight different executive functioning clinical scales: monitor, organization of material, plan/organize, working memory, initiate, emotional control, shift, and inhibit (Gioia et al., 2000). Two meta-domains emerged after factor analysis of the eight clinical scales (i.e., Metacognition Index and Behavioral Regulation Index.)

According to the authors, the Metacognition Index (MI) represents the child's ability to initiate, plan, organize, and sustain future-oriented problem solving in working memory. A child's ability to self-manage and reflect or monitor his or her performance is

portrayed by this index. The MI also represents the ability to problem solve in many situations (Gioia et al., 2000.) The Behavioral Regulation Index represents a child's ability to be flexible and adapt emotions and behaviors through appropriate inhibitory control. Behavioral regulation enables the metacognitive processes to successfully guide active, systematic problem solving, and more generally supports appropriate self-regulation (Gioia et al., 2000).

Raters provide judgments of specific behaviors on a three-point Likert scale (i.e., Never, Sometimes, or Often). Results from the rating scale provide T scores, percentiles, and 90% confidence intervals. Table 3 lists technical adequacy components (i.e., internal consistency, test-retest reliability, and inter-rater agreement) of the *BRIEF* and the *CAB-T* from their respective test manuals and generally indicates good technical adequacy. The *BRIEF* has also has two validity scales. The first one is called the Inconsistency Scale and indicates a conflicting or unusual way of answering. The second one is called the Negativity Scale and measures whether the respondent has a notable negative response style. High scores on these two validity scales can signify reduced validity of the rating scale (Gioia et al., 2000).

The *BRIEF* teacher norms are based on 720 teacher ratings from rural, suburban, and urban areas in Maryland (Gioia et al., 2000). In the norming process, a "Clinical Population" of 166 students was established specifically for the teacher version that included children with developmental disorders or acquired neurological disorders (i.e., ADHD, High Functioning Autism, and Pervasive Developmental Disorder). Due to the accusations of the *BRIEF* being overly sensitive because of limited geographic diversity of the standardization sample, Roth, Erdodi, McCulloch, and Isquith (2015) examined the

Table 3

Technical Characteristics of the Teacher Forms of the BRIEF and CAB-T Executive Functioning scale

Instrument	Internal Consistency	Test-Retest Reliability	Inter-rater Agreement
BRIEF	.80 - .98	.88	.30
CAB-T	.95	.91	.49

Note. Inter-rater agreement for the *BRIEF* is between parents and teachers.

BRIEF scores across studies of typically developing children and adolescents. The results indicated that the *BRIEF* was not overly sensitive (Roth et al., 2015). The *BRIEF*'s authors reported convergent validity was established with high correlations with other measures that assessed inattention, impulsivity, and learning skills (Gioia et al., 2000). Evidence of divergent validity was found based on low correlations between the *BRIEF* and other measures of emotional and behavioral functioning (Gioia et al., 2000).

There are numerous independent research studies on the validity of the *BRIEF* and those provide mixed results. As examples, Bakar, Taner, Soysal, Karakas, and Turgay's (2011) study supported the two-factor model of the *BRIEF* with a sample of 61 students with ADHD. However, Peters, Algina, Smith, and Daunic's (2012) extensive study with over 2000 children did not support the *BRIEF*'s two-factor model. Instead, they found a three-factor model fit better. Other examples of mixed results come from studies comparing the *BRIEF* with neuropsychological executive functioning tests. Oberg and Lukomski (2011) found that scores from the *BRIEF* correlated with neuropsychological tests using a sample of 22 deaf students. Bakar et al. (2011) reported

the *BRIEF* scores did not correlate with neuropsychological tests using a sample of 48 students with traumatic brain injuries and Vriezen and Pigott (2002) reported *BRIEF* scores did not correlate with neuropsychological tests using a sample of 61 children with ADHD. Although, Vriezen and Pigott (2002) went on to state they thought the *BRIEF* was "more sensitive to executive deficits in daily activities" (p. 302).

Clinical Assessment of Behavior. The *Clinical Assessment of Behavior* (*CAB,* Bracken & Keith, 2004) is a broadband behavior rating scale that, according to the manual, was developed to be an objective, comprehensive and highly reliable behavior scale that was closely aligned with the diagnostic categories of the fourth edition of the Diagnostic and Statistical Manual and the Federal Individuals with Disabilities Education Act, 1997. The *CAB* was included in this study because it is considered a well-developed instrument with strong technical characteristics (Merrell, 2008). Furthermore, it contains an executive functioning scale.

As a broadband instrument, the *CAB* assesses a wide range of constructs such as bullying, aggression, and hyperactivity (Bracken & Keith, 2004.) There is a teacher version of the scale and two parent versions. Again, only the teacher version (*CAB-T*) is used in this study and described in this section. Items were developed through identifying applicable content provided by literature pertaining to childhood and adolescent development and psychosocial regulation, reviewing items on existing instruments, and the diagnostic criteria based on the DSM-IV, consideration of behaviors of concern or interest, and suggestions from colleagues. The teacher version contains 70 questions that target a wide range of specific behaviors. There are 13 items that comprise the executive functioning scale. A five-point response format (i.e., Always or Very Frequently, Often,

Occasionally, Rarely, and Never) is used to determine the frequency of behavior observed. Scores are provided through T scores and percentiles. There were 1,689 teachers in the normative data sample (Bracken & Keith, 2004). According to a review of the *CAB* by Beran (2006), the norm group is represented by the four major demographic regions of the United States (i.e. Midwest, Northeast, South and West), but the raters consist of more educated adults than represented in the U.S. population.

The *CAB-T* is divided into Clinical and Adaptive skills clusters. In the Clinical cluster, internalizing, externalizing, and critical behaviors are assessed. The Adaptive cluster assesses social skills, competence, and adaptive behavior. According to Bracken and Keith (2004), the executive function (EF) cluster includes behaviors such as planning, self-regulation, cognitive facility, purpose, persistence, and recall. Scores in the low end of the normal range imply reduced executive function, whereas elevated *T* scores suggest higher functioning. Technical adequacy characteristics as reported in the manual (Bracken & Keith, 2004) are included in Table 3. The executive functioning cluster internal consistency coefficient reported in the manual is $r = .95$.

Few studies examining the *CAB* were able to be located through an EBSCOhost search as of March 15, 2016. One review of the *CAB* in the Mental Measurements Yearbook reported the *CAB* showed strong technical adequacy, but limited evidence of how it could be used to help diagnosis or interventions (Bonner & Volker-Fry, 2005). A second review emphasized concerns about the lack of discrimination across the *CAB* scales (Hattie, 2005). Of the few published studies, one study demonstrated that the *CAB* was useful in the early identification of gifted students (Bracken & Brown, 2008). One study indicated that the results from the *CAB* were often highly correlated with the results

from another behavior rating scale, the *Achenbach Child Behavior Checklist*, but that the mean scores on similarly named scales from the two instruments were statistically significantly different (Myers, 2013).

Procedure

This study was part of a larger study that included another researcher evaluating the executive functioning scale from another broadband behavior rating scale (i.e., *Conners-3*, Conners, 2008). Permission to conduct this research was provided by the School Superintendent, Chief Academic Advisor, or Special Education Director of the three school districts. The Institutional Review Board of Western Kentucky University approved all procedures (see Appendix A). The participants include elementary, middle, and high school teachers from three participating districts (i.e., District 1, District 2, District 3) in three states (i.e., Illinois, Kentucky, and Tennessee). The author of this thesis and a colleague talked to individual teachers to ask if they would volunteer for the study.

The researcher reviewed the informed consent form with the teacher once the participant indicated his/her interest in the project. After consent was obtained, the participants were given an envelope that contained a checklist (see Appendix B) of what needed to be completed along with a question on the teacher (i.e., years of experience) and basic information on the student (i.e., gender, birthdate, special education or Tier 3 status). Tier 3 status indicates that the student is receiving interventions in addition to regular education.

In addition, the *BRIEF* protocol was included along with just the questions that comprised the executive functioning scales on the *CAB-T* and *Conners-3*. Completing all

three behavior rating scales would require too lengthy of a time commitment from participants. Thus, the 13 questions from the *CAB-T* and 16 questions from the *Conners-3* were retyped onto two sheets of paper requiring the same response options as on the original protocols. The *CAB-T* and *Conners-3* protocols were purchased and those blank protocols were included with the collected set of data to address copyright concerns. The participants were asked to complete all ratings at one point in time while thinking of one student receiving Tier 3 (a common educational term for students receiving academic interventions) or special education services. Teachers were asked to think of Tier 3 or special education students in order to obtain ratings on students more likely to be similar to those for which school psychologists would administer such instruments in school settings. The teachers were given four weeks to complete the task and the researchers then picked up the envelopes from the schools. An effort was made to get participants from elementary, middle, and high schools to obtain ratings on a broad age range of students.

Results

The general purpose of this specialist project was to determine if a single scale on a broadband behavior rating instrument adequately measures executive functioning as compared to an instrument that solely measures executive functioning. After teachers filled out the rating scales on the *BRIEF* and *CAB-T*, standard scores obtained through computer scoring programs were entered into the Statistical Package for the Social Sciences (SPSS), version 23, for data analysis. A coefficient alpha of .88 was obtained for the *CAB-T* executive functioning scale, which was slightly lower than the coefficient alpha of .95 reported in the manual. Obtained correlations and effect sizes were evaluated using Cohen's (1992) interpretations where correlations .50 and above are considered large, .30 to .49 are considered medium, and .10 to .29 are small. For Cohen's *d* effect sizes, above .80 is large, .50 to .79 is medium, and .20 to .49 is small.

Research Question One

The first research question asked how strong of a correlation existed between the executive functioning scale on the *CAB-T* and the overall score (Global Executive Composite or GEC) on the *BRIEF*. Pearson *r* correlations for all scale comparisons are listed in Table 4. The correlation between the *BRIEF* (GEC) and the *CAB-T* is .61, which indicates a large or strong correlation.

Research Question Two

The second research question asked what clinical scale on the *BRIEF* results in the highest correlation with the executive functioning scale on the *CAB-T*. The correlations between the *BRIEF* clinical scales and composites with the *CAB-T* executive functioning scale ranged from .29 to .62 (see Table 4). The two composite areas of

Table 4

Correlations Between All BRIEF and CAB-T Executive Functioning Scales

Scales	1	2	3	4	5	6	7	8	9	10	11	12
1. *CAB-T* EF	-	.49**	.29*	.36**	.46**	.47**	.47**	.59**	.52**	.50**	.62**	.61**
2. Inhibit		-	.38**	.62**	.83**	.23	.33**	.42**	.34**	.83**	.49**	.75**
3. Shift			-	.73**	.78**	.28*	.23	.38**	.31*	.48**	.35**	.65**
4. Emotional Control				-	.92**	.19	.12	.21	.12	.58**	.32*	.65**
5. Behavior Regulation Index					-	.28*	.29*	.41**	.31*	.78**	.48**	.82**
6. Initiate						-	.81**	.72**	.59**	.44**	.83**	.67**
7. Working Memory							-	.77**	.73**	.57**	.89**	.73**
8. Plan/Organize								-	.80**	.70**	.86**	.81**
9. Organization of Materials									-	.57**	.81**	.73**
10. Monitor										-	.69**	.89**
11. Metacognition Index											-	.86**
12. Global Executive Composite												-

Note. The *CAB-T* EF = *Clinical Assessment of Behavior* executive functioning scale.
*$p < .05$. **$p < .01$.

Metacognition Index (r = .62) and GEC (r = .61) had the highest correlations with the *CAB-T* EF scale. The clinical scales of Inhibit, Plan/Organize, and Working Memory were hypothesized to have the highest correlations. Of the clinical scales, Plan/Organize had the highest correlation (r = .59) with the *CAB-T*, resulting in a partial confirmation of the hypothesis. While the correlations for the clinical scales of Inhibit (r = .49) and Working Memory (r = .47) were close to a "large" size, the correlations for two other scales were slightly higher (i.e., Organization of Materials = .52; Monitor = .50). The only clinical scale on the *BRIEF* that did not result in a correlation significant at the $p <$ .01 level was Shift.

Research Question Three

The third research question asks how consistent the *CAB-T* EF scale is with the overall composite score on the *BRIEF* and whatever clinical scale had the highest correlation. The first step in evaluating consistency was to examine the mean scores from both instruments. On the *CAB-T*, higher scores reflect a strength in executive functioning and lower scores reflect deficits. Scores on the *BRIEF* are the opposite, in that high scores show deficits and low scores show strengths in executive functioning. To compare the scores from the two instruments, the *CAB-T* scores were reversed. Results are presented in Table 5. To evaluate if the means are statistically significantly different, *t*-tests were conducted. The results showed that the overall *CAB-T* score for executive functioning is significantly different than the *BRIEF* GEC score, $t(64) = 8.04$, $p = .000$, $d = .99$. The Cohen's d effect size indicates the difference is at a large level. Thus, even though the *BRIEF* GEC had the highest correlation with the *CAB-T* EF scale, the *BRIEF* GEC provides a score that is significantly higher (about one standard deviation) than the

Table 5

Consistency of the CAB-T Executive Functioning and BRIEF scales

			T score range	
Scale	Mean	*SD*	Minimum	Maximum
BRIEF scales				
Inhibit	67.9	16.2	42	108
Shift	66.0	15.9	42	101
Emotional Control	65.7	18.7	43	114
BRI	68.5	15.2	44	113
Initiate	69.6	10.8	44	101
Working Memory	72.7	12.1	42	104
Plan/Organize	69.7	11.5	40	94
Organization of Material	69.0	18.2	44	123
Monitor	71.6	13.5	45	109
Metacognition Index	72.3	12.1	44	108
GEC	72.9	13.0	44	108
CAB-T scale				
Executive Functioning	62.6	7.0	45	79

Note. *BRIEF = Behavior Rating Inventory of Executive Function*, BRI = Behavior Regulation Index, BMI = Global Executive Composite, *CAB-T = Clinical Assessment of Behavior – Teacher* version.

CAB-T. The *BRIEF* Plan/Organize scale was the clinical scale with the highest correlation with the *CAB-T* EF scale and the mean difference for those two scales was statistically significant as well, $t(64) = 6.11$, $p = .000$, $d = .74$.

Table 5 also presents the range of T scores obtained on each scale. As can be seen in the table, the maximum *BRIEF* scores are quite extreme, as much as 7.3 standard deviations above the mean. The highest *CAB-T* score was a 79 (2.9 SD above the mean). It was hypothesized that the extreme range of *BRIEF* scores might account for the statistically significantly difference in mean scores. To evaluate that possibility, post-hoc analyses were conducted. The *BRIEF* GEC and Plan/Organize scores were truncated to a high of 80. That is, if the *BRIEF* GEC or Plan/Organize T score was originally above 80, it was changed to 80. Then, comparisons with the *CAB-T* EF scale using the *t*-tests were re-ran. The results indicated that there is still a statistically significant difference between both the *CAB-T* scale and the *BRIEF* GEC ($M = 70.42$; $SD = 9.24$, $t(64) = 8.89$, $p = 000$, $d = .95$), and the Plan/Organize scale ($M = 68.59$; $SD = 9.87$, $t(64) = 6.17$, $p = .000$, $d = .70$). Such results indicate the differences between the instruments cannot simply be explained by the higher score range on the *BRIEF*.

The second step in determining classification consistency was evaluated by determining the percent of time the *CAB-T* score and the *BRIEF* GEC and Plan/Organize scores were both in the same general range of functioning (i.e. average range vs. clinically significant range). Clinically significant was defined as greater than or equal to 1.5 standard deviations above the mean, which is the definition used in the *BRIEF* manual (Gioia et al., 2000). The classification consistency of scores between the *CAB-T*

and *BRIEF* are represented in Table 6. As can be seen in the table, correct classification only occurred approximately two-thirds of the time.

Table 6

Classification Consistency of Scores Considered Average or Clinically Significant Between BRIEF and CAB-T Scales

	Consistency of scores				
CAB-BRIEF	Both scales ≥ 65	Both scales < 65	Only BRIEF ≥ 65	Only CAB ≥ 65	Overall
EF - GEC	36.9% (*n* = 24)	26.2% (*n* = 17)	36.9% (*n* = 24)	0.0% (*n* = 0)	63.1% (*n* = 41)
EF - Plan/Organize	35.4% (*n* = 23)	30.8% (*n* = 20)	32.3% (*n* = 21)	1.5% (*n* = 1)	66.2% (*n* = 43)

Note. EF = *Clinical Assessment of Behavior – Teacher* Executive Functioning scale; GEC = *BRIEF* Global Executive Composite.

Discussion

Executive functioning has become a growing interest over the past two decades, most likely due to the increasing number of individuals that are being diagnosed with disorders with executive functioning impairments, such as ADHD and ASD (Blijd-Hoogewys et al., 2014; Kaufman, 2010). Although a substantial amount of research exists on the *BRIEF* and limited research on the *CAB-T*, no research exists on how these rating scales compare to each other. The current study examined the relationship between the executive functioning scale on the *CAB-T* with the *BRIEF*. This study provided much-needed research information as regards to the psychometric properties of an executive functioning scale on a broadband behavior rating scale.

The current research initially examined the *CAB-T* EF scale to the overall composite score on the *BRIEF*. With measurements that are assessing the same construct, it would be practical for the results to be similar or the same. All results are based on the assumption that the BRIEF is a valid measure of students' executive functioning. The *CAB-T* EF scale and *BRIEF* did result in a large correlation, and the highest correlation, meaning they have a mutual connection. Thus, the initial analysis indicated the *CAB-T* EF scale provides a reasonable indicator of a student's overall level of executive functioning.

The second research question sought to determine which of the *BRIEF*'s eight clinical scales has the highest correlation with the *CAB-T* EF scale. Prior to the analysis, two researchers who independently reviewed the 13 items on the *CAB-T* EF scale concluded that themes from three clinical scales on the *BRIEF* (i.e., Inhibit, Plan/Organize, and Working Memory) were the likely focus of the *CAB-T* EF scale. It

was difficult to determine one predominant domain, in part, because some items were interpreted by the two researchers to mean different things. The prediction was partially correct, as Plan/Organize was the clinical scale that did receive the highest correlation with the *CAB-T* EF scale. The other two predicted scales had relatively strong correlations, but other scales had higher correlations. However, the difference in correlation coefficients among most of the *BRIEF* scales was relatively small. Therefore, it is difficult to determine with certainty which scale or scales on the *BRIEF* best represent what is measured on the *CAB-T* EF scale. Nonetheless, the *CAB-T* EF scale appears to primarily assess students' planning and organization skills based on this study's results.

The third analysis looked at the consistency of scores and classification consistency. While the correlations between the *CAB-T* and *BRIEF* scales were generally close to the minimum level needed to be considered a large correlation, the mean scores were significantly different, even when adjusted for the extremely high scores the *BRIEF* provides. The *BRIEF* consistently provided higher scores than the *CAB-T*. Large correlations but different means could suggest that both the *CAB-T* and *BRIEF* are asking similar questions but are measuring executive functioning differently. Given the *CAB-T* has only 13 executive functioning questions, it would be impossible to measure a broad range of executive functioning skills. The EF scale on the *CAB-T* only provides the practitioner with a limited amount of information to determine a student's level of executive functioning skills. Using only the *CAB-T* to screen for executive functioning deficits would miss a substantial number of students (about one out of three) that would be considered having deficits on the *BRIEF*. Thus, it seems that the use of the *CAB-T* as a

screener of executive functioning caution is questionable, at least with a 1.5 *SD* criteria. Perhaps a lower cutoff score, such as 1.0 *SD* from the mean, might result in better classification consistency.

Strengths and Limitations

The current study, like all studies, has its strengths and limitations. A strength of the current study is the uniqueness of the research. Determining how well a single scale on a broadband instrument measures the construct of executive functioning has not been previously completed. The representativeness of a sample is always a concern when making generalizations of the results. While 100 teachers were contacted for participation in this study, only 65 sets of usable forms were obtained. All participants were obtained from rural areas, which contained minimal ethnic diversity but high levels of poverty. Thus, it is unknown whether these results would generalize to the broader population of teachers. Furthermore, a larger sample would have allowed comparisons among different ages of students. Perhaps there is more consistency of ratings at certain age levels. On the other hand, a strength of this study is that the participants were from three different states. It is rare that studies obtain participants from multi-state sites.

Although some demographic information was obtained from the teachers (i.e., years of experience), more information might have been beneficial. Teacher information such as whether they were a special education or general education teacher could have indicated if special education teachers who have more training with students with execution functioning deficits would have affected ratings. Another limitation is that there was no specific instructions for the teachers to choose a current student to think of when completing the rating scales. Anecdotal feedback indicates some teachers chose

students from previous years. It is possible that the teachers may not have remembered specific situations or circumstances to answer the questions accurately.

Another strength of this study is the use of a cover sheet with directions and procedures. The teachers appropriately indicated if students were classified with specific disabilities or only received Tier 3 intervention. However, the cover sheet did not specify whether the intervention was for behavior or academics. Thus, it is unknown what type of presenting problems those students, which comprised almost half the sample, presented. Having that clarification might also provide an understanding as to how teachers answered questions based on behavior or academic deficits.

To make the task of completing the scales manageable for the teachers, the teachers were only given the specific questions from the *CAB-T* that related to executive functioning. On the full *CAB-T* protocol, those questions would have been scattered among a broad range of questions. It is unknown whether having the executive functioning questions all together affected the way teachers answered the questions. Completing the entire *CAB-T* instrument would have also provided numerous other potential comparisons with the *BRIEF*.

Further Research

Future research could compare the executive functioning scale from the *CAB-T*, or from other broadband instruments, to other narrowband executive functioning behavior rating scales in order to provide additional validity data. Since the publication of the BRIEF, additional narrowband executive functioning scales have been published that might have different emphases. The second edition of the *BRIEF* was recently revised and released in November of 2015. The revised *BRIEF* could be compared to the *CAB-T*

to see if the current research results are found with the new version. It would be interesting to see future research that compared other versions of the rating scales. For example, a parent report version is available for the *BRIEF* and *CAB*, as well as other rating scales that assess executive functioning.

While the current study provides information regarding the consistency of the *CAB-T* and *BRIEF*, it might be informative if future research examined the consistency of the two scales at certain age levels or within specific populations including Tier 3 students (i.e., academic vs. behavior) and specific disability groups (e.g., ADHD, ASD, TBI). If possible, future research could examine the accuracy of the instruments. Current results indicated that the *CAB-T* has lower scores than the *BRIEF*. However, it is unknown which is more accurate. If there was a way to determine accuracy of scores, such information would lend support to the construct validity of the scales.

Summary

The current research provided much needed information as regards to the consistency of the *CAB-T* and *BRIEF* executive functioning ratings. It also provided insight into whether a single scale from a broadband instrument can adequately assess executive functioning with a limited amount of questions. Overall, the statistical analyses suggest that while the *CAB-T* and *BRIEF* scores are strongly correlated, the two instruments are not producing equivalent scores that would result in classification consistency. The results would not be persuasive enough to encourage a practitioner to only use a scale from the *CAB-T* to screen a student's executive functioning skills. Additional information from the BRIEF or other narrowband instruments that assess executive functioning could provide a more comprehensive evaluation of students'

strengths and deficits. Much more research is needed to provide additional information relative to the consistency of results with other instruments measuring executive functioning.

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Appendix A: Institutional Review Board Approval Letter

INSTITUTIONAL REVIEW BOARD
OFFICE OF RESEARCH INTEGRITY

DATE: November 6, 2014

TO: Lauren Lamar
FROM: Western Kentucky University (WKU) IRB

PROJECT TITLE: [678955-1] The Consistency of Executive Functioning Rating Scales
REFERENCE #: IRB 15-193
SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: November 6, 2014

REVIEW TYPE: Expedited from Full Board Review

Thank you for your submission of New Project materials for this project. The Western Kentucky University (WKU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited from Full Board Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project.

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact Paul Mooney at (270) 745-2129 or irb@wku.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Western Kentucky University (WKU) IRB's records.

Appendix B. Teacher Checklist

Teacher's Name: _____ **Student's disability (if applicable): _____**

Years of Experience:_____ **Tier 3 services? YES NO**

Date: _____ **Student's Date of Birth: _____**

Directions:

Think of a student who is receiving Tier 3 or special education services and fill out the BRIEF and attached scales consecutively (one right after the other). The name of the student should not be included. Please use the checklist to be sure all the information is provided. Thank you!

Checklist:

___ Signed consent for participating in the study

___ Filled in Teacher and Student Information

___Protocols were completed consecutively

___ All questions answered on:

___ BRIEF

___ Attached ratings

___Completed protocols and consent form returned to designated envelope

___Returned to Briese Chapman or Lauren Lamar