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The Relationship and Consistency in Ratings Between the Conners 3 Executive Functioning Scale and the Behavior Rating Inventory of Executive Functioning

Lauren R. Lamar
Western Kentucky University, lauren.lamar095@topper.wku.edu

THE RELATIONSHIP AND CONSISTENCY IN RATINGS BETWEEN THE CONNERS 3 EXECUTIVE FUNCTIONING SCALE AND THE BEHAVIOR RATING INVENTORY OF EXECUTIVE FUNCTIONING

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Lauren R. Lamar

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THE RELATIONSHIP AND CONSISTENCY IN RATINGS BETWEEN THE *CONNERS 3* EXECUTIVE FUNCTIONING SCALE AND THE *BEHAVIOR RATING INVENTORY OF EXECUTIVE FUNCTIONING*

Date Recommended April 1, 2016

Carl Myers

Dr. Carl Myers, Director of Specialist Project

Elizabeth L. Jones

Dr. Elizabeth Jones

Samuel Kim

Dr. Samuel Kim

Dean, Graduate School

4/19/16

Date

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Lauren R. Lamar May 2016 43 Pages

Directed by: Carl Myers, Elizabeth Jones, and Samuel Kim

Department of Psychology Western Kentucky University

Broadband behavior rating scales are commonly used in schools to gain data to help make critical decisions about a student's educational programming and whether he or she is eligible to receive special education services. Several broadband behavior rating scales are beginning to include a scale that assesses executive functioning. This study investigated how scores from an executive functioning scale on a broadband behavior rating scale (*Conners 3*, Conners, 2008) compared to an established scale that only measures executive functioning (*Behavior Rating Inventory of Executive Function* [*BRIEF*], Gioia, Isquith, Guy, & Kenworthy, 2000). Teachers completed both scales at the same point in time on students receiving academic interventions or special education services. Results indicated that the *Conners 3* executive functioning scale primarily measures one scale on the *BRIEF* related to planning and organization skills. These results suggest that those using the *Conners 3* executive functioning scale should be aware of the limited range of skills assessed and that they should be cautious in their interpretation of the scale when evaluating a student's executive functioning skills.

Introduction

The role of a school psychologist can be compared to detective work; searching for clues and gathering information about students to pinpoint strengths and weaknesses in order to better serve them in the classroom and maximize their potential. Often, school psychologists use various commercially available instruments to gather data on a student in order to gain a better understanding of him or her in both home and school environments. A relatively new area that is frequently assessed is a student's executive functioning. The recent focus on executive functions is believed, based on recent research, to provide a significant advancement in the understanding of an individual and his or her unique profile (Henry, Cornoldi, & Mahler, 2010). Additionally, understanding a student's executive dysfunction can help drive specific skill deficit interventions (Burns, 2016).

Different theories and models compete to explain the cognitive abilities that encompass executive functioning. Nonetheless, the majority of the literature agrees that executive functioning is used as an umbrella term to explain the complex cognitive processes that serve goal-directed behaviors (Elliott, 2003; Geurts, Corbett & Solomon, 2009; Ozonoff & Jensen, 1999). Executive functions are most commonly associated with skills involving mental control and self-regulation, such as inhibition, shifting between tasks/thoughts, emotional control, initiation, working memory, planning/organization, organization of materials, and self-monitoring (Cooper-Kahn & Dietzel, 2008).

The recent emphasis in focusing on students' executive functioning stems, in part, from trying to explain why some extremely bright students fail to perform at their level of potential and why some students present as "poor students" despite their high academic

achievement (Chevalier, 2015; Miyake & Friedman, 2012; Mulder & Cragg, 2014). Studies have investigated the correlation between executive functions and academic achievement and these studies have implicated a clear association between executive functioning and academic achievement in the areas of math (Bull & Scerif, 2001), science (Nayfield, Fuccillo, & Greenfield, 2013), and language comprehension, reading, and writing (Gathercole, Alloway, Willis, & Adams, 2006; Swanson & Jerman, 2007). Furthermore, executive functioning deficits have been reported for children with a variety of intellectual, behavioral, and developmental disabilities (Lagattuta, Sayfan, & Monsour, 2010).

Children are often referred to school psychologists and other professionals when they encounter academic difficulties, demonstrate challenging behaviors, or show characteristics of developmental disabilities. While executive functioning skills are not always assessed, school psychologists and other professionals are increasingly becoming more aware of the discrete behaviors associated with executive function problems regardless of a formal recognition of a disability (Gioia et al., 2000).

Despite the general agreement that focusing on students' executive functioning skills is important, school personnel have encountered problems measuring students' executive functions and understanding how these functions affect students' behavior and academic performance (Hughes & Graham, 2002). Traditionally, executive functions are measured through clinic-based, neuropsychological tasks such as the Wisconsin Card Sorting Task, the Stroop task, Tower of Hanoi, and random number generation. However, these tasks tap into different, and narrowly defined, executive functioning subskills (Miyake et al., 2000). Another problem with such tasks is the inability to use the same

task across different ages due to the developmental nature of executive functioning skills (Miyake & Friedman, 2012). Perhaps the biggest concern is the lack of ecological validity in that the results of such tasks may not generalize to how the child performs in a classroom setting (Miyake & Friedman, 2012). While these tasks can provide valuable information about a person's cognitive processing, the usefulness of such information is questionable when analyzing how a child functions in a classroom.

To address concerns related to the ecological validity of the clinical neuropsychological tests, norm-referenced behavior rating scales have been developed to assess students' executive functioning skills in home and school settings. Behavior rating scales are based on others' perceptions about the students and have their limitations as well. Behavior rating scales that are considered "broadband" instruments measure a variety of problem behavior and adaptive behavior constructs on the same instrument and are widely used in schools for screening and evaluation purposes (Shapiro & Heick, 2004).

Some of those broadband instruments commonly used by school psychologists contain a scale that purports to measure executive functioning. Given the complexity of the executive functioning construct and its many subskills, it is unknown how well a single scale within a broadband instrument, comprised of only a few items, measures executive functioning. This study evaluates how well the executive functioning scale on a broadband measure, the *Conners - third edition* (*Conners 3*, Conners, 2008), compares to a widely used behavior rating scale that only measures executive functioning skills, the *Behavior Rating Inventory of Executive Function* (*BRIEF*, Gioia et al., 2000). The results of this study could yield important information on the usefulness of the *Conners 3* scale

as a screener of executive functioning, or might determine if that scale is only measuring a specific executive functioning subskill. The consistency of scores between the two instruments will be examined by having teachers complete both scales on students likely to have executive functioning deficits. Resulting scores between the *Conners 3* and the *BRIEF* will be compared through correlations, statistical comparisons of mean scores, and general classification (i.e., average or clinically significant) consistency.

Literature Review

Executive functioning is an umbrella term to explain the complex cognitive processes that serve goal-directed behaviors (Cooper-Kahn & Dietzel, 2008; Elliott, 2003; Geurts et al., 2009; Lagattuta et al., 2010; Mulder & Cragg, 2014; Ozonoff & Jensen, 1999). The cognitive processes and goal-directed behaviors are considered to be developmental in nature, such that improvements in those skills occur throughout childhood and beyond, due to practice and maturation. Executive functions' significant increase across childhood parallels the increased development of the prefrontal cortex.

Studying the developmental changes in executive functions can help to understand how children, who often act without thinking, develop into mature adults who are able to plan, organize, and control their thoughts and actions. Dawson and Guare (2010) provide the following description of the neurological development of executive functions that begin in the early stages of life. A child's brain weighs about 10-12 ounces at birth and increases to a little over three pounds by late adolescence. This significant growth accounts for many changes in the brain. The white matter of the brain develops through a process called myelination, a fatty sheath that forms as insulation around the axons to increase the speed of communication across the nerve cells. Myelination in the frontal lobe continues well into young adulthood, which parallels the development of executive skills. In addition to the white matter of myelin, gray matter is made up of nerve cells and the connections between them are called synapses. There is an initial increase in gray matter in early childhood by age five, and a second significant growth of gray matter occurs around 11 or 12 years, which occurs primarily in the frontal lobe. The pruning of connections that are not needed or used follows the gray matter growth spurts.

Thus, executive functioning skills are impaired or enhanced by the individual's environment. This concept indicates that it is important to enhance students' executive functions during these time periods by practicing the underlying skills of executive functioning (Dawson & Guare, 2010).

The Center on the Developing Child (2012) at Harvard University also supports the notion that children are born with the potential to develop executive functions. If children do not get what they need from their relationships with adults, or if those environments are toxic, then there could be a significant delay in their skill development. Adverse environments resulting from neglect, abuse, and/or violence may expose children to toxic stress, which disrupts brain development, thus affecting the development of executive functions. This highlights the importance of providing healthy environments, where adults demonstrate modeling and offering supports as needed, leading children to practice the necessary skills on their own in order to enhance his or her executive functioning.

There has been a strong empirical interest in executive functions due to its association with various behaviors such as decision-making, self-regulation, academic performance, and social cognition, as well as with mental and behavior disorders (Lagattuta et al., 2010). Meltzer (2010) notes the executive functioning domain is not considered above other cognitive domains; it is considered to be intra- and inter-cognitive, which means this domain functions between and within other cognitive domains. Reciprocal interaction with other cognitive and motor domains is essential to understanding the how and when of executive functions. Furthermore, it is important to

understand the many skills that comprise executive functions. The following section gives further information for conceptualizing executive functioning skills.

Executive Functioning Skills

The complexity of the literature on executive functioning is due to many theoretical models and many specific skills or subskills within the construct (Suchy, 2009). Chan, Shum, Toulopoulou, and Chen (2008) describe six theoretical models of executive functioning based on complex systems of neuropsychological processing. One model reviewed by Chan et al. (2008) is the Stuss and Benson's tripartite model. In their model, "there are three systems that interact together to monitor an individual's attention and executive functions" (p. 205). These systems deal with (a) one's ability to maintain alertness and attention control, (b) higher order functioning such as, planning, inhibition, and shifting between thoughts and ideas, and (c) self-monitoring. The *BRIEF* (Gioia et al., 2000), which is an instrument used in this study, is based on Stuss and Benson's tripartite model. The *BRIEF* includes many specific skills or subskills that purport to follow the theoretical model: inhibit, shift, emotional control, initiate, working memory, plan/organize, organization of materials, and monitor. Gioia et al. (2000) provides the following description of these skills.

Inhibit. The executive functioning skill, Inhibit, deals with "the ability to inhibit, resist, or not act on an impulse, and the ability to stop one's own behavior at the appropriate time" (p.17). A deficiency in one's inhibition will resemble impulsivity. Many children with Attention Deficit Hyperactivity Disorder (ADHD) are thought to have a deficiency in the inhibition domain, which may result in calling out in class or any 'acting without thinking' behaviors (Cooper-Kahn & Dietzel, 2008).

Shift. The ability to shift refers to the ability to move easily from one situation or task to another. Shift is also known as cognitive flexibility. This skill requires a student to interpret information in different ways, change approaches, and try new strategies when one is deemed unsuccessful.

Emotional control. Emotional control refers to the use of rational thoughts on one's feelings. Students who become easily frustrated and lash out in an emotional way to minor events lack emotional control.

Initiate. Initiate refers to the ability to begin a task independently and generate ideas, responses, or problem solving strategies. Initiate relates to a student's ability to take control of his or her own learning by beginning academic tasks and homework as needed.

Working memory. Working memory refers to one's capacity to mentally hold information in order to complete a task. This is an important skill in order for students to retain and recall information to solve a problem or comprehend textbook passages.

Plan/Organize. Plan refers to "the ability to anticipate future events, set goals, and develop appropriate steps ahead of time to carry out a task or activity" (p.19). Organize refers to the ability to impose order on everyday tasks, such as being prepared for a class and "to understand main points expressed in presentations or written material" (p.19).

Organization of materials. Organization of materials refers to one's ability to organize possessions or materials (e.g., desk, backpack) to complete tasks more efficiently.

Monitor. Monitor refers to the ability to evaluate one's own performance and measure it against a standard of what is expected. If a student uses a study strategy and he or she performs poorly on the test, this skill aids the student in trying different approaches to get a more desirable outcome (Cooper-Kahn & Dietzel, 2008).

Executive Functions and Academic Achievement

Students are frequently expected to master certain skills at earlier grades, resulting in high demands on students to integrate and change information such as, completing lengthy reading and writing assignments, managing long-term projects, demonstrating proficient note taking, studying, and test taking, and being able to self-monitor their performance (Meltzer, 2010). There is extensive evidence supporting the notion that executive functioning skills, such as working memory, are predictors of successful academic performance across all ages (Meltzer, 2010; Swanson, 2006; Swanson & Jerman, 2007). The role of working memory in respect to academic achievement is evident in tasks that require complex information processing and integrating abstract ideas, such as reading comprehension, conceptual learning, and the mapping of symbolic numbers to quantities (Mulder & Cragg, 2014). As children age, they begin to pay greater attention to their immediate environment and tend to process environmental cues more effectively, which help them better control their thoughts and actions (Chevalier, 2015). All these tasks pertaining to academic achievement require the integration of the executive functioning subskills.

There is disagreement within the field as to whether it is better to intervene directly with specific academic skills or to focus on increasing cognitive processes underlying academic skills. Researchers that emphasize direct interventions have

questioned the usefulness of improving cognitive processing concepts like executive functioning to enhance students' academic achievement (Burns, 2016; Ysseldyke & Reschly, 2014). However, others believe that focusing on teaching specific behaviors related to executive functioning skills do improve the academic performance of students (Dawson & Guare, 2010; Meltzer, 2010). For example, Meltzer (2010) noted that students who have learning and/or attention difficulties are able to bridge the gaps between their skills and academic demands by developing effective strategies and applying more focused effort.

According to a meta-analysis by Melby-Lervåg and Hulme (2013), working memory training programs have demonstrated significant effect sizes, but only initially. They analyzed 21 studies that contained a pre- and post-test of a working memory training group (N = 707) and a control group (N = 641), where each group contained three age groups (under age 10, 11-18 years, and young adults under the age of 50). A large mean effect size (d = .79, 95% CI [.50, 1.09]) was obtained when evaluating the immediate effects of the working memory training program across ages, with larger gains shown in younger children (under age 10) than the older children (11-18 years). The six studies that conducted a follow-up assessment an average of nine months later, obtained results that were not significant; however, sustained impact was evidenced by a small to moderate effect size (d = 0.31, 95% CI [−0.19, 0.80]).

When evaluating the effects of training programs on visuospatial working memory, Melby-Lervåg and Hulme (2013) analyzed 18 studies that included training (N = 610) and control (N = 469) groups, including the same three age groups. Results indicated a moderate effect size for immediate training (d = 0.52, 95% CI [0.32, 0.72])

across all ages. For the four studies that had long-term follow-up, a significant and moderate effect size remained (d = 0.41, 95% CI [0.13, 0.69]). These results suggest teachers might want to consider having their students practice these executive functioning tasks in the classroom in order to enhance students' academic skills.

Executive Functioning Among Students with Disabilities

Research on executive functions has indicated that students with learning difficulties and attention problems are not the only students who encounter more deficiencies in their executive functions (Schuchardt, Gebhardt, & Mäehler, 2010). Executive function deficiencies have been noted in persons with other disabilities, such as intellectual disabilities (Henry et al., 2010; Lanfranchi, Jerman, Dal Pont, Alberti, & Vianello, 2010), hearing loss (Oberg & Lukomski, 2011), traumatic brain injury (Vriezen & Pigott, 2002), Autism Spectrum Disorder (Granader et al., 2014), and ADHD (Barkley, 1990). It has been suggested that if weaknesses in executive functioning for individuals with specific disabilities are pinpointed, then there is a better understanding as to why the individual struggles with everyday activities (Henry et al., 2010). To illustrate the types of difficulties researchers have noted with children with specific disabilities, ASD and ADHD will be used as examples.

Children with Autism Spectrum Disorder (ASD) often have deficits in the executive functioning skills of cognitive flexibility and planning/organization (Geurts et al., 2009; Granader et al., 2014). Some studies report deficits in task initiation (Bramham et al., 2009) and working memory (Goldberg et al., 2005), and there are mixed results concerning self-regulation and response inhibition (Hill, 2004; Russell & Jarrold, 1998). The inconsistencies in findings are thought to be due to ASD being a spectrum disorder,

where those with the disorder exhibit a wide range and severity level of cognitive and communication behaviors (Geurts, de Vries, & van den Bergh, 2014). Inconsistencies could also be due to how the executive functions were assessed (Hill, 2004). While numerous studies have evaluated executive functioning skills in children with ASD, it is recommended that future studies focus on how and when executive functioning deficits impact children with ASD (Geurts et al., 2014).

Russell A. Barkley, a clinical psychologist who is known for his work with ADHD, has dedicated much effort to researching executive functions in children with ADHD (Barkley, 1990, 1997, 2001). He proposed that a deficiency in one executive function could affect other executive functions. Specifically, the development of inhibition and working memory impact other executive functioning skills, such as the ability to pay attention or plan events. Furthermore, Barkley suggests that there is not a dichotomy between normal and abnormal executive functioning; rather, executive functioning skills should be viewed as on a continuum.

Studies have demonstrated that teacher ratings on the *BRIEF* distinguish between students with ADHD and typically developing control groups of students (Alloway et al., 2009; Sullivan & Riccio, 2007). Alloway et al. (2009) found students with ADHD (mean age = 9.75 years) had the most deficits on the *BRIEF* in the areas of Inhibit, Behavior Regulation Index, Working Memory, Monitor, and the overall Global Executive Composite. Sullivan and Riccio's (2007) sample of similarly aged students with ADHD (mean age = 11.4 years) had the most deficits on the *BRIEF* in the areas of Working Memory, Plan/Organize, Metacognition Index, and the Global Executive Composite. While the authors of both studies implied the *BRIEF* is useful for distinguishing between

typically-developing students and students with ADHD, a pattern of results unique to ADHD was not found. That is, the *BRIEF* did not distinguish between students with ADHD and students with general working memory problems (Alloway et al., 2009) or students with other clinical disorders (Sullivan & Riccio, 2007).

Problems Assessing Executive Functions

As previously noted, much of the early research on executive functioning has focused on clinically based, neuropsychological tests. Such tests have been criticized for being "crude and underspecified in terms of the cognitive processes that they engage" (Chan et al., 2008, p. 202). It is argued that the most troublesome problem with measuring executive functions is the task-impurity problem. That is, tasks measuring executive functions are commonly tapping into other cognitive processes, such as general intelligence and language, not specified under executive functions (Denckla, 1996; Lagattuta et al., 2010; Miyake & Friedman, 2012).

The other major concern regarding neuropsychological tests is the lack of ecological validity, defined as the relationship between test results and performance in real world situations (Chan et al., 2008). Although the neuropsychological tasks are thought to yield significant information about how one operates, there are few practical implications for the school setting. Tasks measuring executive functions are conducted in a one-on-one clinical setting, which provides little information about how a student operates in the classroom (Miyake & Friedman, 2012). Classrooms are filled with routines, rules, and distractions, which requires students to utilize multiple executive functions in order to be successful. Pulling individual students out of the classroom to

conduct these one-on-one tasks is timely and provides little information about how their executive functions affect their classroom behaviors and academic achievement.

Behavior Rating Scales

In an effort to enhance ecological validity and the task-impurity problem, behavior rating scales have been developed to assess executive functioning (Naglieri & Goldstein, 2014). In general, behavior rating scales are instruments that list many specific behavioral characteristics and an individual familiar with the student (e.g., parent, teacher) rates the frequency with which the student displays those behaviors on a Likert scale. Statistical analyses, such as factor analysis, help determine which items cluster together to provide a rating on a specific skill. Norm-referenced scores can then be obtained through the use of normative samples. Scores that are 1.5 to 2 standard deviations above the mean are considered clinically significant, meaning the student demonstrates an extensive level of problem behaviors compared to his or her typical same age peers.

Although behavior rating scales are widely used by school practitioners, they have their limitations. Rating scales have been criticized for undesirable variability, which are attributable to rater variance, setting variance, temporal variance, and instrument variance (Campbell & Hammond, 2014). Rater variance refers to when raters rate the same student in the same setting and produce different results. Setting variance refers to the variability of the student's behavior in different settings. Temporal variance occurs when a student's behavior changes over time and instrument variance occurs when behavior scales designed to measure the same construct yield different results (Campbell & Hammond, 2014). Other criticisms of ratings scales include such things as a lack of useful

information to help with choosing interventions and that results are not truly objective because they are based on persons' perceptions of behaviors, rather than actual measures of behavior (McConaughy & Ritter, 2014).

Despite the limitations, behavior rating scales have been considered a critical source of assessment data when assessing students' behavior and have major advantages as an assessment tool. Behavior rating scales are based upon direct observations by the raters, are inexpensive, simple to administer, and easy to score (Campbell & Hammond, 2014). Respondents are generally parents or teachers who have regular contact with the student in his or her natural environment. Another benefit in using rating scales is having normative data available, which help determine if the behaviors are developmentally appropriate when the student is compared to his or her typical same age peers.

Measuring Executive Functions with Rating Scales

Despite the difficulty accurately assessing executive functioning with neuropsychological tests, researchers continue to explore this topic due to its strong association with the ability to self-control and self-regulate one's thoughts and behaviors, which have significant implications for everyday lives (Miyake & Friedman, 2012). In an effort to enhance ecological validity in the assessment of executive functioning, behavior ratings scales have been developed. Behavior rating scales are used to gain additional informative data about executive functions and can be used as part of a screening, a comprehensive child evaluation, or a research protocol (Baron, 2000). There are instruments specifically designed for measuring executive functions, such as the *BRIEF* (Gioia et al. 2000), *Comprehensive Executive Function Inventory* (*CEFI*, Naglieri & Goldstein, 2013) and the *Barkley Deficits in Executive Function Scale* (*BDEFS*, Barkley,

2012). These scales are considered narrowband instruments in that they are highly cohesive when measuring one construct (i.e., executive functioning). This study will focus on the *BRIEF* to assess executive functioning, because it is commonly used in the schools and there have been an extensive number of studies confirming its validity (e.g., Alloway et. al., 2009; Gioia, Isquith, Retzlaff, & Espy, 2002; Sullivan & Riccio, 2007). The *BDEFS* was not considered for this study because it does not include a teacher rating scale form. At the time this study was conceptualized, the *CEFI* was new and lacked substantial research support in regards to the scale's validity and reliability.

Broadband instruments assess a wide range of behavioral and psychological constructs. Recently, broadband behavior rating scales are also including an executive functioning scale. For example, instruments such as the *Behavior Assessment System for Children, Third Edition* (*BASC-3*, Reynolds & Kamphaus, 2015) and the *Conners, Third Edition* (*Conners 3*, Conners, 2008) have an executive functioning scale, such scales are comprised of only a few items, which likely provide only a limited view of executive functioning skills. This study will focus on the *Conners 3* because it is a widely used instrument in the schools (Charach, Chen, Hogg-Johnson & Schachar, 2009; Sullivan & Riccio, 2007). The *BASC-3* was not yet released at the time of data collection.

While broadband instruments are starting to include executive functioning scales, there is little research that indicates how well these scales, usually comprised of only a few items, compare to a narrowband instrument that assesses only executive functioning. One such study did investigate the relationship of the Frontal Lobe/Executive Control (FLEC) scale on the *BASC-2* to the *BRIEF* (Sullivan & Riccio, 2007). Results indicated that the scores on the FLEC scale were significantly correlated with scores on the *BRIEF*.

The authors suggested that the FLEC scale is an efficient tool when assessing executive functions.

Purpose

Because school psychologists often use broadband behavior rating scales when assessing students' social emotional skills (Shapiro & Heick, 2004), knowing if executive functioning scales on other broadband instruments are adequate measures of executive functioning would be useful. The purpose of this study is to compare the executive functioning scale on the *Conners 3* to the *BRIEF*. To make an a priori prediction about the *Conners 3* executive functioning scale, the seven items that comprise that scale were reviewed and compared to definitions of the *BRIEF* scales. Five of the seven items seemed to be related to the Plan/Organize scale on the *BRIEF* so a specific comparison will be made between the *BRIEF*'s Plan/Organize scale to the *Conners 3* executive functioning scale. To make the comparison between the two instruments, teachers were asked to think of a student with academic difficulties or an educational disability and complete these instruments at the same point in time. Teachers were asked to think of a student with educational concerns to increase the likelihood of obtaining scores reflecting executive dysfunction.

A significant correlation between two instruments measuring executive functions is useful information, as strong and significant correlations would be a good indicator of appropriate use of the *Conners 3* to screen executive functioning. Generally, it would be expected that two instruments measuring the same construct would have strong correlations but a high correlation does not necessarily mean consistent scores in terms of classification consistency (Myers, 2013). For additional information that has practical

usefulness to school psychology practitioners, this study will also investigate the classification consistency of the two instruments. Specifically, do the two instruments yield scores in the same classification range (i.e., average or clinically significant range) for each student? If one instrument is more likely to score higher than the other, practitioners need to be aware of such results.

The following research questions were addressed:

1. How well does the executive function scale on the *Conners 3* correlate with the Global Executive Composite on the *BRIEF*?

2. What scale on the *BRIEF* results in the highest correlation with the *Conners 3* executive functioning scale? It is hypothesized that the highest correlation will be with the Plan/Organize scale on the *BRIEF* due to the types of items included on the *Conners 3*.

3. How consistent are the mean scores from the *Conners 3* executive functioning scale and the *BRIEF* Global Executive Composite and whatever *BRIEF* scale has the highest correlation in research question number 2. Those two scales on the *BRIEF* will also be compared to the *Conners 3* for classification consistency. Specifically, what percentage of the scores will fall in the same classification range (i.e., average vs. clinically significant)?

Method

Participants

Of 100 packets that were distributed, 67 teachers returned a packet. Two packets contained incomplete data, which left 65 teachers as participants in this study. The teachers' years of experience ranged from one to 34 years (M = 12.0, SD = 9.6). The teachers were from three different rural school districts: Tennessee (n = 23), Illinois (n = 25), and Kentucky (n = 17). Each teacher was asked to think of one student receiving Tier 3 or special education instruction and between the ages 6 and 18 years when completing the instruments. Tier 3 is a common educational term to refer to students receiving relatively intensive instructional interventions. The students that were rated included 48 males and 17 females (M = 10.3 years, SD = 3.1 years). Grade levels of the students included 31 (47.7%) elementary students, 18 (27.7%) middle school students, and 16 (24.6%) high school students. About half of the students were receiving academic and behavioral interventions (considered Tier 3) and the other half had a variety of educational disabilities (see Table 1).

Based on data from the 2013-2014 school year, school district 1 in Tennessee serves 11,515 students with the following racial demographics: 89.8% White, 7.7% African American, 0.5% American Indian and Alaska Native, 0.6% Asian, 0.1% Native Hawaiian or Other Pacific Islander, 6.1% Hispanic or Latino, and 1.4% two or more races. The median household income for families in school district 1 was $52,588 compared to $44,140 for the state of Tennessee (U.S. Census Bureau, 2012). Eight out of 20 schools in this district meet the eligibility criteria for the Healthy Hunger-Free Kids

Table 1

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

Act of 2010, where students receive free breakfast and lunch. The remaining schools range from 28% to 50% of students on free or reduced lunch.

Based on data from the 2011 American Community Survey, school district 2 in Illinois serves 2,898 students and has the following demographics: 84.6% White, 12% African America, 0.7% Asian, 0.7% two or more races, and 1.8% other race. The median household income for this area is $37,042 and 62% of students in this district are on free or reduced lunch (U.S. Census Bureau, 2009).

Based on data from the 2013-2014 school year, school district 3 in Kentucky serves 2,997 students and has the following racial demographics: 86.7% White, 10% African American, 0.4% Asian, 2.6% two or more races, and 0.2% other race (U.S.

Census Bureau, 2009). The median household income for this area is $43,350 and students receiving free or reduced lunch ranges from 54% to 69%.

Instruments

Behavior Rating Inventory of Executive Function. The *BRIEF* (Gioia et al., 2000) is a narrowband behavior rating scale designed to measure executive functioning skills of children and adolescents aged 5 to 18 years old. Although there is a parent form and teacher form, only the teacher form will be reviewed. The teacher form includes 86 items, which were selected for their relevance across the age range (Gioia et al., 2000). Teachers respond to the individual behaviors listed on the *BRIEF* using a three-point scale (i.e., Never, Sometimes, Often). The behavioral descriptors and instructions are written at a fifth grade reading level and each questionnaire takes approximately 10 to 15 minutes to complete (Gioia et al., 2000). Using computerized scoring, the raw scores on the scales and indices are converted to T scores, which have a mean of 50 and a standard deviation of 10. The higher the T score obtained, the higher the degree of executive dysfunction. A T score of 65 or higher is considered clinically significant (Gioia et al., 2000).

The *BRIEF* provides eight clinical scales and three broad indices (Gioia et al., 2000). The eight clinical scales include Inhibit (impulse control), Shift (cognitive flexibility), Emotional Control (control emotional responses), Initiate (initiate tasks appropriately), Working Memory (retain information while completing a task), Plan/Organization (set goals and develop a plan of action), Organization of Materials (organize materials and workspace), and Monitor (assess performance and monitor behaviors). The indices are the result of combinations of the clinical scales and include the indices of Behavioral Regulation (Inhibit, Shift, and Emotional Control) and

Metacognition (Initiate, Working Memory, Plan/Organize, Organization of Materials, and Monitor). Additionally, the Global Executive Composite is the result of combining all eight clinical scales and is provided to give an overall executive functioning indicator.

The teacher form of the *BRIEF* uses normative data based on 720 children and adolescents (56% female, 44% male; 72% White, 14% African American, 4% Hispanic, 6% Asian, and 1% Native American/Eskimo). Socioeconomic status (SES) categories were represented as follows: 3% upper class, 22% upper middle, 36% middle, 32% lower middle, and 6% lower class. Normative data were collected only in Maryland, which serves as a limitation for this test (Sullivan & Riccio, 2007).

The *BRIEF* manual (Gioia et al., 2000) reports internal consistency coefficients (i.e., Cronbach's alpha) for the scales on the teacher version ranging from .90 to .98 for the normative sample and ranging from .84 to .98 on a clinical sample. The teacher version of the *BRIEF* resulted in test-retest reliability coefficients ranging from .83 to .92, with a mean coefficient of .87 over a 3.5-week period.

When considering the validity of the *BRIEF*, correlations were examined comparing the *BRIEF* to other instruments measuring behavioral functioning, because no other rating scales measuring executive functioning were available at that time (Gioia et al., 2000). The authors compared the *BRIEF* to behavior rating scales and emphasized comparable results on specific scales (e.g., *BRIEF* BRI highly correlated with the aggression scales on the 1991 version of the *Child Behavior Checklist* and the original 1992 version of the *Behavior Assessment System for Children*). In general, the *BRIEF* has received favorable reviews in the literature, emphasizing evidence for the reliability, validity, and diagnostic utility (Baron, 2000; Pizzitola, 2002). It was also thought to

provide a good indication of how a child performs in complex, novel, and unstructured everyday problem solving strategies (Blijd-Hoogewys, Bezemer, & van Geert, 2014).

Conners Rating Scales, Third Edition. The *Conners 3* (Conners, 2008) is an updated version of a series of measures assessing Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents ranging from 6 to 18 years old. While the previous edition of the instrument was considered a narrowband instrument only assessing ADHD, the *Conners 3* is a broadband behavior rating scale that also assesses constructs such as executive dysfunction, learning problems, aggression, and peer/family relationships. Respondents are asked to rate a student based on the extent of the problem behaviors in which the student has exhibited in school over the past month (Conners, 2008). The respondent is asked to rate each behavior with one of four choices: not true at all, just a little true, pretty much true, or very much true. The respondent's choices are converted to T scores with a mean of 50 and a standard deviation of 10. T scores ranging from 40-59 are considered in the average range, scores ranging from 60-69 are considered elevated, and scores 70 and above are considered very elevated. It is recommended in the manual (Conners, 2008) that elevated scores indicate heightened concern and may need close monitoring and very elevated scores indicate a significant area of concern needing intensive support. Many of the items on this instrument are similar to classification criteria used for disorders on the American Psychiatric Association's *Diagnostic and Statistical Manual, Fourth Edition* (Kao & Thomas, 2010).

The teacher version of the *Conners 3*, which is the version used in this study, has a normative sample consisting of 1,200 children and adolescents, with 50 boys and 50 girls in each one-year interval age group (Conners, 2008). The racial/ethnicity

distribution for this sample closely matches the U.S. population. When considering the reliability of the teacher version of the *Conners 3*, the manual reports internal consistency coefficients (Cronbach's alpha) ranging from .77 to .97, and 2- to 4-week test-retest reliability coefficients ranged from .72 to .83 (all correlations significant, $p < .01$). There was a study comparing this instrument to the *BRIEF* (Sullivan & Riccio, 2007); however, it was conducted with an outdated version of the *Conners' Rating Scales.*

The specific scale of interest in this study is the Executive Functioning (EF) scale, which consist of seven items. The *Conners 3* manual does not specify the theoretical model used in the creation of the EF scale. However, the manual notes that the EF scale is intended to address the deficits of "poor planning and strategy formation, limited organizational skills, lack of self-inhibition, … and poor self-regulation of emotions" (Conners, 2008, p. 15). The Cronbach's alpha for the EF scale on the teacher version was .92 and the test-retest reliability coefficient was .73.

Procedure

Permission to conduct the study was obtained from an administrator at each school district and Institutional Review Board approval was obtained from Western Kentucky University (see Appendix). An email was sent out to the participating schools explaining the study and asking for volunteer teachers to participate. Once the volunteer teachers responded, they were provided with a packet. The packet contained an informed consent form, directions for completing the instruments, along with a form for teachers to provide information about themselves (i.e., years of teaching experience) and the student (i.e., age, gender, Tier 3 or disability).

This study is part of a larger study that is also comparing another executive functioning scale from a broadband behavior rating scale (i.e., the *Clinical Assessment of Behavior*, Bracken & Keith, 2004) to the BRIEF. As such, teachers were asked to fill out three rating scales at the same point in time: (a) the entire teacher form of the BRIEF, (b) 13 items comprising the executive functioning scale from the *Clinical Assessment of Behavior* rating scale, and (c) 16 items from the *Conners 3*. Only the scores from the *Conners 3* and the *BRIEF* will be examined in this study. Teachers were asked to think of one student with an educational disability or receiving Tier 3 intervention services when filling out the rating scales. On the form, teachers were provided with a checklist to ensure all necessary information was completed.

The teachers were given two weeks to complete their packets. Once the teachers completed their packets, they returned the packets to the school psychologist's mailbox at their school. The school psychologist at each school was responsible for collecting the packets.

Results

The purpose of this study is to compare the executive functioning scale on a broadband rating scale (i.e., *Conners 3*) to a narrowband executive functioning rating scale (i.e., *BRIEF*). An initial analysis examined the internal consistency (Cronbach's alpha) of the *Conners 3* EF scale to evaluate how closely related the items are as a group. A Cronbach's alpha of .86 was obtained.

The first research question was, how well does the executive functioning scale on the *Conners 3* correlate with the Global Executive Composite on the *BRIEF*? Table 1 shows the correlations between all scales on the *Conners 3* and the *BRIEF*, including the composite areas on the *BRIEF*: Behavior Regulation Index (BRI), Metacognition Index (MI), and Global Executive Composite (GEC). When comparing the EF scale on the *Conners 3* to the GEC on the *BRIEF*, a Pearson correlation of .54 was obtained that was statistically significant at the $p < .01$ level.

The second research question was, what scale on the *BRIEF* results in the highest correlation with the *Conners 3* EF scale? It was hypothesized that the highest correlation would be with the Plan/Organize scale on the *BRIEF* due the types of items most often included on that scale on the *Conners 3.* As the correlations show in Table 2, the hypothesis was supported. The scale on the *BRIEF* with the highest correlation with the *Conners 3* EF scale was the Plan/Organize scale with a correlation of .72. That correlation was statistically significant at the $p < .01$ level. It is interesting to note that the *Conners 3* EF scale did not achieve statistically significant correlations with the Shift and Emotional Control scales on the BRIEF and had low correlations with the Inhibit and Behavior Regulation Index.

Table 2

Correlations Between the BRIEF and Conners 3 EF Scale

Scales	1	2	3	4	5	6	7	8	9	10	11	12
1. Conners 3 EF	-	.27*	.21	.14	.26*	.58**	.55**	**.72****	.54**	.42**	.68**	**.54****
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. Org. Materials									-	.57**	.81**	.73**
10. Monitor										-	.69**	.89**
11. Metacognition Index											-	.86**
12. Global Executive Composite												-

Note. The *Conners 3* EF = Executive Functioning.
*$p < .05$. **$p < .01$.

The third research question was, how consistent are the mean scores from the *Conners 3* EF scale, the *BRIEF* Global Executive Composite, and whatever *BRIEF* scale had the highest correlation in research question number 2? The mean scores for the *Conner 3* and *BRIEF* scales are in Table 3. The mean T score for the *BRIEF* GEC was 6.3 points higher than the mean T score on the *Conners 3* EF scale. The use of a *t*-test indicated this difference was statistically significant, $t(64) = 4.47$, $p = .000$, $d = .54$. The effect size (Cohen's *d*) was at a "medium" level (Cohen, 1992). The BRIEF Plan/Organize mean score was 3.0 points higher than the *Conners 3* EF scale. The use of a *t*-test indicated this difference was statistically significant, $t(64) = 3.01$, $p = .004$, $d = .28$. The effect size (Cohen's *d*) was at a "small" level (Cohen, 1992).

Also as part of the third research question, those two scales on the *BRIEF* (i.e., GEC and Plan/Organize) were compared to the *Conners 3* for classification consistency. Specifically, what percentage of the scores will fall in the same classification range (i.e., average vs. clinically significant)? The *BRIEF* uses ≥ 1.5 standard deviations above the mean as clinically significant. Therefore, a 1.5 standard deviation criterion was used to determine clinical significance. The classification consistency is presented in Table 4. The *BRIEF* GEC and the *Conners 3* EF scale provided a correct classification consistency of 67.6%, meaning that consistent determination of classification levels would only occur two-thirds of the time. Although a recommended level of classification consistency could not be found, a basic rule of thumb for inter-rater agreement is to have a minimum of 80% agreement (Alessi & Kaye, 1983). If the 80% standard is applied here, the classification consistency between the *BRIEF* GEC and *Conners 3* EF scales are

Table 3

Mean Scores for the BRIEF and Conners 3 EF Scale

Scales	Mean	*SD*
BRIEF		
Inhibit	67.9	16.2
Shift	66.0	15.9
Emotional Control	65.7	18.7
Behavioral Regulation Index	68.5	16.2
Initiate	69.7	10.8
Working Memory	72.7	12.1
Plan/Organize	69.7	11.5
Organization of Materials	69.0	18.2
Monitor	71.6	13.5
Metacognition Index	72.3	12.1
Global Executive Composite	72.9	13.0
Conners 3		
Executive Functioning	66.7	10.0

Table 4

Classification Consistency of Scores Considered Average or Clinically Significant Between the BRIEF and Conners 3 EF Scale

	Consistency of scores				
Conners-BRIEF	Both scales ≥ 65	Both scales < 65	Only BRIEF ≥ 65	Only EF ≥ 65	Overall
EF - GEC	47.6% (n = 31)	20.0% (n = 13)	26.2% (n = 17)	6.2% (n = 4)	67.6% (n = 44)
EF - Plan/Organize	52.3% (n = 34)	30.8% (n = 20)	15.4% (n = 10)	1.5% (n = 1)	83.1% (n = 54)

Note. EF = *Conners 3* Executive Functioning scale; GEC = *BRIEF* Global Executive Composite.

inadequate. It can also be noted that when there were inconsistencies between those two scales, the *BRIEF* GEC tended to provide higher scores than the *Conners 3* EF scale.

The overall classification consistency between the BRIEF Plan/Organize and the *Conners 3* EF scales was at 83.1%, which is above the 80% minimum criteria. Even though there were fewer inconsistencies between the two scales, when there was a difference, the *BRIEF* was practically always higher than the *Conners 3* EF scale.

Discussion

School psychologists commonly use behavior rating scales, along with other sources of assessment data, in order to gain information about students' academic and behavioral functioning. Evaluation information drives data based decisions when considering educational programming and skill specific interventions. Making those critical decisions require informed interpretation of the scores obtained from specific sources, such as rating scales. This study adds to the literature by providing new and important information on how to interpret results from an executive functioning scale from a broadband and narrowband instrument. This study addressed the broad question of how a specific scale, consisting of only a few items, assesses the construct of executive functioning as compared to a well-established narrowband instrument (*BRIEF*) that solely measures executive functioning.

The current study indicates that the executive functioning scale from the *Conners 3* does not provide equivalent results as the composite score on the *BRIEF*. The *Conners 3* EF scale was significantly correlated with the overall *BRIEF* composite score (GEC), with a correlation of .54, which indicates a moderate relationship. Furthermore, the obtained mean scores had a statistically significant difference and resulted in classification consistency only two-thirds of the time. In other words, the scores for one out of every three students would not result in the same interpretation (i.e., average range or clinically significant). Such a frequent discrepancy could have a major impact simply because of the assessment instrument chosen to assess executive functioning.

The *Conners 3* EF scale correlates the highest with the Plan/Organize scale on the *BRIEF*, which means the items on the *Conners 3* EF scale are primarily assessing

students' planning and organizational skills. Thus, the current study indicates the *Conners 3* EF scale would be an appropriate measure of those specific types of EF skills. The classification consistency between those two scales was considered adequate, although the mean score differences were still statistically significant.

Based on the National Association of School Psychologists' (NASP) ethics code, Standard II.3.8 specifies that school psychologist are required to make adequate interpretation of findings so that recipients of the information are able to make informed decisions (NASP, 2010). Thus, it is important for school psychologists to be aware that an average score on the *Conners 3* EF scale does not necessarily mean the student has adequate executive functioning skills. The *BRIEF* typically provided higher scores than the *Conners 3*, suggesting a school psychologist using the *Conners 3* EF scale would be less likely to report a clinically significant concern about a student than if she were using the *BRIEF*. Additionally, a clinically significant score on the *Conners 3* EF scale primarily suggests a deficit in planning and organization skills; it should not be used to make conclusions about a student's executive functioning skills in general. This study's results indicate a student's level of executive functioning can be interpreted differently merely based on the assessment tool used to measure the construct. Knowing if a student's executive functioning skills are typical compared to his or her same age peers is important information.

Strengths and Limitations

A strength of this study is that the methodology controlled for temporal, setting, and rater variance. Thus, differences in results between the *BRIEF* and *Conners 3* are most likely due to instrument variance. Another strength is that this study also obtained

ratings on a wide range of ages of students from three different states. This study provides useful information for school psychologists when interpreting a student's executive functioning depending on the assessment tool being used. These results allow the school psychologist to make a more informed decision to determine if further assessment is needed to evaluate a student's executive functioning skills. This is important due to the many decisions schools psychologists have to make regarding a student's educational needs.

A possible limitation of this study is the relatively small sample size. With a larger sample, additional analyses could have been conducted on different ages of students or with specific disabilities. As such, it is unknown if comparability of results between the two instruments is stronger at certain age levels. Similarly, it would be informative to know if students with certain disabilities are rated higher on different executive functioning skills. As noted in the literature review, deficits in executive functioning skills are typically noted in children with disorders such as ADHD and ASD.

Another limitation is that the results of this study are dependent upon the BRIEF being a valid measure of executive functioning. Few studies provide evidence of the BRIEF's validity, as it was the first behavior rating scale purporting to measure executive functioning. It is possible that other recent narrowband rating scales are a more accurate and valid representation of students' executive functioning skills in a school setting.

Future Research

Due to the discrepancy in results obtained between the two instruments in this study, future research is needed to investigate the comparability of scores when measuring executive functions on other narrowband and broadband instruments.

Additional executive functioning rating scales have been published in recent years, including a recently revised version of the *BRIEF*. Comparability of the executive functioning scales themselves, using the methodology from this study, would be informative to those considering adoption of one or more of those instruments. Additional research is needed evaluating how scores may vary depending on the educational disability of a student. Furthermore, this study used teachers as informants. This study could be replicated using the parent versions of the rating scales and parents as informants. Perhaps most importantly, future research could examine whether information obtained from measures of executive functioning translates into successful interventions for the students.

Summary

This study has important implications for practitioners related to interpreting results from the assessment of executive functioning skills. The *Conners 3* EF scale is not an adequate measure of a student's overall executive functions. However, it is a good measure of a student's planning and organizational skills. When referral concerns include the possibility of executive function deficits, practitioners are encouraged to use a narrowband EF rating scale rather than rely on a single scale from a broadband behavior rating scale.

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Appendix: 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.