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THE IMPLICATION OF EXECUTIVE FUNCTIONS AND PROTOTYPICAL STUDENT

PERFORMANCE IN MIDDLE SCHOOL

By Sabrina Anne Hartman

Submitted in Partial Fulfillment of the Requirements of the Degree of

Doctor of School Psychology

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PHILADELPHIA COLLEGE OF OSTEOPATHIC MEDICINE
DEPARTMENT OF PSYCHOLOGY

Dissertation Approval

This is to certify that the thesis presented to us by _Sabrina Hartman_

on the _16th_ day of _June_____, 20 _11_, in partial fulfillment of the

requirements for the degree of Doctor of Psychology, has been examined and is

acceptable in both scholarship and literary quality.

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Abstract

Over the course of the past 25 years, "executive functions" have been investigated more and more frequently in relation to cognitive functioning across the lifespan. Within that time frame, researchers have examined various changes that are specific to the adolescent brain. The research has begun to elucidate the relationship between executive functioning and the developmental period of adolescence. Previous studies have examined the utility of using specific rating scales as a means to assess executive functioning across the lifespan, with most of these utilizing scale level analyses. Given the lack of specificity regarding what elements exactly comprise "executive functioning," the literature has failed to produce specific, behavioral descriptors that would make more tailored interventions possible. The present study sought to extrapolate, further the specific behaviors that were rated to be most frequently endorsed for prototypical students. More specifically, the present study further examined teachers' ratings of academically successful and academically unsuccessful students, based on the endorsements on the Behavior Rating Inventory of Executive Function (BRIEF) utilized by Bobik (2008). Results of the present study suggest that academically successful students demonstrate less difficulty with executive functions than do academically unsuccessful students.

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Chapter 1

Introduction

Statement of the Problem

As the demands of "high-stakes" testing continue to put strain and emphasis on numbers in the educational world, teachers and students alike are left to operate under high-stress conditions in which children and their instructors are measured by their abilities to produce under high demand conditions. The ability to respond to these "external demands" is typically associated with executive function in the literature. Executive functioning is typically thought of as the "brain boss" or CEO of brain function.   They are often thought of as a set of interrelated capacities as opposed to a unitary function: "The executive functions serve as an integrative directive system exerting regulatory control over the basic, domain-specific neuropsychological functions (e.g. language, visuospatial functions, memory, emotional experience, motor skills) in the service of reaching an intended goal (Gioia & Isquith, 2004, p.139)."

From a developmental neuropsychological perspective, the ability to self-regulate, monitor, correct, and plan are in high demand during the middle school years. More often than not, teachers, parents, and school psychologists are seeking to determine if there is a skill or performance deficit present which leads to inconsistent work production and fluctuating grades in the classroom. These inconsistencies are most often present during the middle school years or adolescence.   McCloskey (McCloskey, VanDivner, & Perkins, 2009) points out "The development of executive function capacities do not necessarily coincide with the culturally imposed transitions imposed upon our students. Appreciation of the natural variations in maturation of brain functions is crucial for ensuring appropriate educational experiences for those children who are demonstrating nothing more than natural maturational delays in the development of executive capacities" (p.71). Just as children mature physically at differing

rates, developmental variability in regard to executive capacities is often misunderstood within the context of the culturally imposed expectations (i.e., self-sufficiency, organization, and self-regulation demands of middle school). Further, using functional Magnetic Resonance Imaging (fMRI), Brocki & Bohlin (2004) found that the skills often required in middle school expectations may not be commensurate with adolescent development. Gioia, Isquith, and Kenworthy (2000) note that the final endpoint of executive function development varies by individual, as does the order and timing of the developmental progression of these capacities. Further, deficits in executive functions have been linked to impacting learning to a significant degree (Dietzel & Edelstein, 2004 as cited in Wright, 2010). With this in mind, and considering the increased executive demands of middle school, it is crucial to determine effective intervention to accommodate for these developmental variations, specifically during the period of adolescence.

This study will continue to add to the literature regarding executive functions and their relationship with adolescents. This study will also help to identify profiles of academically successful and academically unsuccessful students using the Behavior Rating Inventory of Executive Functions (BRIEF) which will lead to specific patterns of intervention based on these profiles.

Purpose of the Study

The present study seeks to expound upon recent research through the review of archival data using the Behavior Rating Inventory of Executive Functions (BRIEF) for the purpose of determining specific item level analyses profiles for academically successful and academically unsuccessful students. The following research questions will be examined:

Research Question

What specific items on the BRIEF are most closely related to teacher perceptions of academically successful students and what items are most endorsed for academically unsuccessful students?

Chapter 2

Review of Literature

Conceptualization of Executive Function

From a theoretical perspective, executive functions (EF) can be defined as "a set of multiple cognitive capacities that act in a coordinated way. Executive functions are directive capacities that are responsible for a person's ability to engage in purposeful, organized, strategic, self-regulated, goal-directed processing of perceptions, emotions, thoughts, and actions (McCloskey, Perkins, & VanDivner, 2009, p.15). Further, executive skills are believed to be an integral part of a ''supervisory'' system that works to control behaviors and allows the individual to engage in goal-directed behaviors (Gioia, Isquith, Guy, & Kenworthy, 2000).

Stuss & Alexander (2002) suggest that these skills are particularly important when faced with a novel situation or a problem which requires the development of appropriate strategies and solutions. Executive dysfunction often manifests itself in daily life tasks which include organization, task completion, self-regulation, initiation, self-monitoring, flexibility, and memory (Barkley & Fischer, 2011). Given the complex nature of these deficits, executive dysfunction is most readily apparent in school settings. Research has begun to explore the effects of EF deficits within the context of the school setting (Latzman, Elkovitch, Young, & Clark, 2010; Sesma, Levine, Mahone, Eason, & Cutting, 2009). Executive dysfunction can result in difficulty completing assignments, in being prepared for class, remembering materials needed for projects and assignments, and in organizational skills. Further, in the social realm, executive weaknesses can impact response inhibition and turn taking (Best & Miller, 2006). Executive dysfunction thus interferes with an individual's ability to regulate behavior and attention, producing attentional, impulsivity, and learning problems (Brocki & Bohlin, 2006).

Miyake (2000) proposed a theoretical framework of EF using a "unity and diversity" hypothesis. He noted that inhibition, information updating, monitoring (working memory) and shifting were specific yet integrated entities as assessed on various tasks of executive function. Results of his study suggested that EF be considered both as a unitary and as a diverse construct whereby analysis of performance on tasks be viewed in the context of EF organization and roles based upon the task.

Barkley (2001) presents an evolutionary model for understanding executive functions. He defines executive functions in terms of self-regulation and inhibition, with self-control as their main purpose. Self-control requires one to act in opposition to one's own immediate impulses and self-interest in order to achieve a future goal. Executive functions oversee self-directed and intentional behavior used in self-regulation. When an intention of a future goal is effectively regulated by executive functions, a temporal delay occurs during which the consequences of alternative responses are weighed in terms of risk/benefit ratios. Barkley links behavioral inhibition to four specific executive functions: 1) nonverbal working memory; 2) verbal working memory; 3) self-regulation of affect/motivation/arousal, and 4) reconstitution. These components represent covert forms of behavior relative to the self that allows one to test, mentally, the possible consequences before engaging in a response, thereby facilitating adaptive functioning (Bobik, 2008 pp. 16).

According to McCloskey (McCloksey, Perkins, & VanDivner, 2009), executive functions are responsible for directing four domains of functioning which include Action, Cognition, Perception, and Emotion. Action is the executive control of modes of output including behavior in the external world and storage and retrieval of internal representations; Cognition is the executive control of thoughts and thought processing; Perception is the executive control of

modes of perceptual input including external sensory stimuli (visual, auditory, kinesthetic) and internal (representational) stimuli, and Emotion is the executive control of moods, feelings, and the processing of emotions.

Further, McCloskey also presents a conceptual understanding of the use of these functions in various arenas. More specifically, he presents four arenas where the engagement and use of these self-regulatory functions can vary, dependent upon the arena. These arenas include: intrapersonal, or the ability to control one's own internal states; interpersonal, or one's control in relation to interaction with others; environmental, or one's interaction with the environment; and the symbol system arena, or the ability to utilize the culturally derived symbol system used to process and share information (i.e., reading and writing) (McCloskey, Perkins, & Van Divner, 2009).   Within the conceptual understanding of executive functioning, McCloskey describes the varied levels of engagement that an individual may experience in relation to executive functions. These are described as self-activation, self-regulation, self-realization, self-determination, self -generation, and Trans-self- integration.

Self-Activation is the initiation and "ramping up" of basic executive functions related to an awakened state of mind and to overcoming sleep inertia. Self-Regulation comprises a set of control capacities that cue and direct functioning across the domains of sensation/perception, emotion, cognition, and action. The current model posits 31 self-regulation executive functions. According to the McCloskey Model of Executive Functions (McCloskey, 2010) executive functions can be thought of in terms of 31 areas. These include Perceive, Energize, Gauge, Initiate, Focus, Sustain, Stop/Interrupt, Inhibit, Modulate/Adjust, Execute, Sequence, Monitor, Correct, Shift, Flexible, Hold, Manipulate, Store, Retrieve, Anticipate/Foresee, Plan (Short-term), Organize, Generate, Associate, Analyze, Evaluate/Compare, Choose/Decide, Pace,

Sense/Time, Estimate Time, and Balance. The definitions of these functions are described in

Table 1.

Table 1

Description of the McCloskey 31 Self-Regulation Executive Functions

Self-Regulation Executive Function	Description
Analyze	The Analyze function cues the realization of the need to examine more closely perceptions, feelings, thoughts or actions to obtain a greater understanding of a problem or situation.
Anticipate/Foresee	The Anticipate function cues the anticipation of conditions or events in the very near future, such as the consequences of one's own perceptions, feelings, thoughts and/or actions.
Associate	The Associate function cues the realization that associations need to be made between the current problem situation and past problem situations and cues the activation of the resources needed to carry out the required associative problem-solving routines.
Balance	The Balance function cues the regulation of the trade-off between opposing processes or states (e.g., pattern versus detail; speed versus accuracy; humor versus seriousness) to enhance or improve experiencing, learning, or performing.
Choose/Decide	The Choose/Decide function cues the need to achieve closure, i.e., to make a choice among alternatives.
Correct	The Correct function cues the use of appropriate routines for correcting errors of perception, emotion, thought, or action based on feedback from internal or external sources.
Energize	The Energize function cues the channeling of energy and effort into perceiving, feeling, thinking or acting.
Estimate Time	The Estimate Time function cues the use of time estimation routines (e.g., cueing the engagement of mental functions that enable a person to have an internal sense of how long something will take to complete, or how much time is still left in a specific period of time).

Evaluate/Compare	The Compare/Evaluate function cues the realization of the need to make comparisons among, or evaluate the adequacy of, perceptions, feelings, thoughts or actions.
Execute	The Execute function cues the engagement of a well-known series of perceptions, feelings, thoughts, and/or actions, especially in cases in which automated routines have been practiced and used frequently.
Flexible	The Flexible function cues a willingness to alter the frame of reference for the direction and engagement of perceptions, emotions, thoughts or actions in reaction to what is occurring in the internal or external environments.
Focus	The Focus function cues the direction of attention to the most relevant specifics (perceptions, emotions, thoughts, and/or actions) of a given environment, situation, or content and downgrading or ignoring the less relevant elements.
Gauge	The Gauge function cues identification of the demands (perceptual, emotional, mental, and physical) of a task or situation and cues the activation of the perceptions, emotions, thoughts, or actions needed to engage the task or situation effectively.
Generate	The Generate function cues the realization that a novel solution is required for the current problem, and cues the activation of the resources needed to carry out the required novel problem-solving.
Hold	The Hold function cues activation of the necessary cognitive processes required to maintain information in working memory and continues cueing these processes until the information is manipulated, stored, or acted on as desired.
Inhibit	The Inhibit function cues resistance to, or suppression of urges to perceive, feel, think, or act on first impulse.
Initiate	The Initiate function cues the initial engagement of perceiving, feeling, thinking, or acting.
Manipulate	The Manipulate function cues the use of working

	memory or other cognitive processes for the manipulation of perceptions, feelings, thoughts, or actions that are being held in mind or being accessed in the environment.
Modulate/Adjust	The Modulate function cues the alteration of perceptions, feelings, thoughts and actions.
Monitor	The Monitor function cues the activation of appropriate routines for checking the accuracy of perceptions, emotions, thoughts, or actions.
Organize	The Organize function cues the use of routines for sorting, sequencing, or otherwise arranging perceptions, feelings, thoughts, and/or actions, to enhance or improve the efficiency of experience, learning, or performance.
Pace	The Pace function cues the awareness of and the regulation of the rate at which perception, emotion, cognition, and action are experienced or performed.
Perceive	The Perceive function cues the use of sensory and perception processes to become aware of (take information in from) the external environment or to tune into "inner awareness" of perceptions, emotions, thoughts or actions as they are occurring.
Plan (Short-term)	The Plan function cues the engagement of the capacities required to identify a series of perceptions, feelings, thoughts, and/or actions that, if carried out, would be most likely to produce a desired outcome in the very near future (within minutes to within several hours).
Retrieve	The Retrieve function cues the activation of cognitive processes responsible for finding and retrieving previously stored information about perceptions, feelings, thoughts and actions. The more specific the demands or constraints placed on the retrieval task, the greater the requirements for precision of retrieval cues.
Sense/Time	The Sense Time function cues the monitoring of the passage of time (e.g., cueing the engagement of the mental functions that enable a person to have an internal sense of how long he or she has been perceiving, feeling, thinking or acting).

Sequence	The Sequence function cues the orchestration of the proper syntax of a series of perceptions, feelings, thoughts, and/or actions, especially in cases in which automated routines are being accessed or are initially being developed.
Shift	The Shift function cues a relatively quick change in the direction and engagement of perceptions, emotions, thoughts or actions in reaction to what is occurring in the internal or external environments.
Stop/Interrupt	The Stop/Interrupt function cues the sudden, immediate discontinuation of perceiving, feeling, thinking, or acting.
Store	The Store function cues the movement of information about perceptions, feelings, thoughts and actions from the mental processing environment of the present moment into "storage" for possible retrieval at a later time.
Sustain	The Sustain function cues sustained attention to the most relevant specifics (perceptions, emotions, thoughts, and/or actions) of a given environment, situation, or content.

Note. *"McCloskey, Unpublished Manuscript, 2010."*

Given that the self-regulation categories encompass a wide variety of executive functions, McCloskey re-organizes them into six clusters: Attention, Engagement, Evaluation, Solution, Efficiency, and Recollection. The first or Attention Cluster comprises the Perceive, Focus/Select, and Sustain functions. Next is the Engagement cluster, which includes the Attention cluster but also the following functions: energize, initiate, inhibit, flexibility, stop/interrupt, shift, and o includes also the Evaluation Cluster. The third is the Evaluation cluster, in which modulate, balance, monitor, and correct functions are included, as is the Attention cluster. The fourth cluster, Solution, includes these functions: anticipate, gauge, estimate time, analyze, generate, associate, plan, organize, evaluate/compare, choose/decide, and also the Recollection and Evaluation Clusters. The Efficiency or fifth cluster includes:

sense/time, pace, sequence, execute, and the Evaluation Cluster. The sixth and final cluster is the

Recollection cluster comprising the hold, manipulate, store, and retrieve functions as well as the

Attention and Evaluation Clusters.

The next realm that McCloskey discusses is Self-Realization, which directs cognitive

processes that engage in self-awareness, self-reflection and self-analysis. This cues cognitive

processes to access accumulated information about oneself and to apply it in specific situations

to initiate, sustain, or alter behavior.

Self-Determination includes foresight/long-term planning and goal generation. It directs

the use of cognitive processes to construct visions of the future and plans for action over longer

periods of time.   Further, it directs reflection on the past for purposes of improving or altering

behavior and thinking in the future.

Self-generation directs the posing of speculative questions related to the meaning and

purpose of life and/or the ultimate source(s) of reality and physical existence, mind-body

relationships, spirit, and soul, contemplating existence beyond the physical plane. It also directs

the generation of a philosophy of life used to guide self-awareness, self-realization and the other

levels of executive function processes, serving as a basis for an ultimate source of intentional

behavior direction.

Finally, McCloskey describes trans-self integration. Trans-self integration directs the

engagement of mental processes that enable the realization and the experiencing of a trans-self

state of ultimate or unity consciousness. In most spiritual traditions, this state is considered the

highest achievement of human consciousness and therefore very different from the maladaptive

states characteristic of clinical diagnoses of dissociative states.

Development of Executive Function in Adolescents

From a developmental neuropsychological perspective, research has recently begun to investigate and identify further, the specific aspects of adolescent brain development. Recent research has begun to elucidate the nature and development of the adolescent brain in relation to executive functions. Dynamic changes in neurochemistry, fiber architecture, and tissue composition occur in the adolescent brain. The course of these maturational processes is being mapped with greater specificity, owing to advances in neuroimaging; they indicate grey matter volume reductions and protracted development of white matter in regions known to support complex cognition and behavior (Bava & Tapert, 2010).   It has been shown that the greatest changes to the parts of the brain that are responsible for functions such as self-control, judgment, emotions, and organization occur between puberty and adulthood (Brocki & Bohlin, 2004). Current brain research suggests that there is a physiological change related to the development of executive function capacities in adolescence (Lenroot & Giedd, 2006; Giedd et al., 1999; Blakemore & Choudhury, 2006). In a study by Dr. Jay Giedd (1999) of the National Institute of Mental Health in Bethesda, Maryland, fMRI's were performed on the brains of 145 normal children every two years; these were examined in order to understand further, brain development. The fMRI's enabled researchers to measure the volume of white and gray matter in the brain. This measurement showed an elimination of synapses after adolescence, supporting the theory that connections are pruned during the teenage years.

During adolescence, two of the brain regions that have consistently been shown to undergo continued development are the prefrontal cortex and parietal cortex (Blakemore & Choudry, 2006). The prefrontal cortex (the foremost area of the frontal lobes) is thought to play an important role in coordinating thought and actions with internally motivated intentions or

goals (Miller & Cohen, 2001; Lezak, 1995 as cited in Rogers, 2010).   The partial convergence of inputs from many brain systems and internal connections of the prefrontal cortex (PFC) may allow it to play a central role in the synthesis of diverse information needed for complex behavior (Miller & Cohen, 2001). Luna, Padmanabhan, & O'Hearn (2010) examined various functional magnetic resonance imaging (fMRI) studies to review the development of cognitive control in adolescence. The results of their investigation suggested that prefrontal systems play a primary role in executive processes and have a protracted development into adolescence. Given the complex presentation of material in the middle school environment (i.e., note-taking, etc.), students are often required to invoke higher level executive processes. However, given the differences in maturation of executive function development, many students may struggle to negotiate these tasks effectively.

The frontal lobes coordinate behavioral actions toward goals, make judgments with respect to time management, and also play a role in terms of decisions with respect to material to be remembered. Over the lifetime of a human being, there is continuing structural development in the brain. The brain is the last structure to mature in the human being and the prefrontal cortex regions are the last to mature in the human brain. Among brain pathways, the fronto-temporal pathways are last to develop (Reynolds, 2008). Current research has begun to demonstrate a longer and inconsistent pattern of development across the lifespan; thus slower development may preserve executive function capacity in later life (Reynolds, 2008).

Steinberg (2005) noted that adolescence may be a critical developmental period for both normative and maladaptive patterns of development. One of the problems facing adolescents is the suboptimal pattern of development, which has been associated with broad patterns of psychopathology, such as the excessive down-regulation of mood and motivation that

characterizes many internalizing difficulties, or the inadequate control of arousal that is

associated with a wide range of risky behaviors typically seen as externalizing problems.

Assessment of Executive Functions

There are vast differences within the literature regarding the definitions of executive

functions; thus most studies purporting to describe them, lack consistency. Best and Miller

(2010) conducted a literature review to examine the theoretical and methodological issues

associated with the assessment of executive functions over time. Their findings highlight the

difficulties with assessment of EF across the lifespan. More specifically, they note that

components of various EF measures vary in their developmental trajectories. Most research has

focused on narrow age ranges, for example 2-5 (Isquith, Gioia, & Espy, 2004 as cited in Best &

Miller, 2010). They discussed the fact that despite the large literature base of EF, there is no true

developmental account of EF across childhood and adolescence.

Additionally, there are numerous instruments currently available that measure a variety of

aspects of executive functioning. However, the nature of executive function makes it difficult to

assess, because it involves an individual guiding his or her behavior in novel, unstructured, and

non-routine situations that require some degree of judgment (Banich, 2009).   Best practice

suggests that assessment batteries typically include a multi-dimensional assessment of executive

function capacities through both direct (e.g., standardized individual assessment) and indirect

(e.g., via third-party rating scales using behavior checklists) measures. "Since executive function

covers such a wide domain of skills, there is no single agreed upon "gold-standard" test of

executive function" (Banich, 2009).   Many studies assess executive function capacities via

direct measures. Some examples of direct measures which purport to assess distinct aspects of

executive function capacities include the NEPSY-II (Korkman, Kirk, & Kemp, 2007),

Trailmaking Tests such as the Rey-Osterich Complex Figure Drawing, Wisconsin Card Sorting

Test (WCST, Heaton, 1981), Cognitive Assessment System (CAS, Naglieri & Das, 1997), Delis

Kaplan Executive Function Scale (DKEFS, Delis, Kaplan, & Kramer, 2000), Conners

Continuous Performance Test-II (Conners, 2000). When considering direct measures versus

rating scales, Reynolds (2008) suggests that EF abilities should include multiple methods, using

a variety of test formats.

In addition to direct measures, indirect, behavior checklists are also often utilized in

assessment of executive functions. These measures are typically completed by parents or

teachers or individuals who have direct contact with the student being rated. Some of the most

common checklists used in schools and clinical settings include the Behavior Rating Inventory of

Executive Function (Gioia, Isquith, Guy, and Kenworthy, 2000), Child Behavior Checklists

(Achenbach, 1991) and the Behavior Assessment System for Children – Second Edition (BASC-

2, Kamphaus & Reynolds, 2007). Reynolds (2008) suggests that behavior rating data related to

EF would assist in developing a full picture of EF skills. McCloskey (2010) notes "Unlike

measures of cognitive capacities and academic skills, behavior rating scales have the potential to

extend the assessment of executive functions across all four domains of functioning within all

four arenas of involvement." Although he identifies the fact that the full utility in these

instruments has yet to be fully realized, the expanded coverage across all four domains of

functioning within all four arenas of involvement makes rating scales potentially invaluable

sources of information about a client's use or disuse of executive functions. The BRIEF is one

of the most commonly used rating scales for assessing executive function. In fact, the BRIEF is

the only EF behavior rating scale presently available. The Behavior Rating Inventory of

Executive Functions (BRIEF) covers a broader range of Arenas and Domains; however, items are highly nonspecific, combining many arenas and domains at once.

Behavior Rating Inventory of Executive Function

The Behavior Rating Inventory of Executive Function (BRIEF) was developed to assess executive functions based upon ratings of a child's everyday behaviors. Raters are instructed to draw on their recollections of the most recent six month period and indicate the frequency of occurrence (1 = Never; 2 = Sometimes; 3 = Often) of the perceptions, feelings, thoughts or actions described in each item.

The item organization of each BRIEF version suggests three levels of score interpretation consistent with the test structure: 1) Global Composite Level; 2) Index Level; and 3) Scale Level. The parent and teacher ratings are divided into eight scales which include: inhibit, shift, emotional control, initiate, working memory, plan/organize, organization of materials, and monitoring. These scales and the behaviors resulting from their purported dysfunction are described in the following paragraphs.

Inhibit- This refers to the ability to resist impulses and to stop one's behavior at the appropriate time. Children with difficulties in this area may display high levels of physical activity, inappropriate physical responses to others, the tendency to interrupt and disrupt group activities, and a general failure to "look before leaping."

Shift- Shifting is the ability to make transitions, tolerate change, problem solve flexibly, and switch or alternate one's attention from one focus or topic to another. Caregivers often describe children who have difficulty with shifting as being somewhat rigid or inflexible, and preferring consistent routines.

Emotional Control- This reflects the influence of the executive functioning on the expression and regulation of one's emotions. Children with emotional control difficulties often have overblown emotional reactions to seemingly minor events.

Initiate- Initiate is the ability to begin a task or activity without being prompted to do so. Key aspects of initiation include the ability to generate ideas, responses, or problem solving strategies independently. Children with initiation difficulties typically want to succeed at and to complete a task, yet have difficulty getting started.

Working Memory- This refers to the capacity to hold information in mind in order to complete a task, encode and store information, or generate goals. Working memory is also needed to sustain attention.

Plan/Organize- Planning involves setting a goal and determining the best way to reach a goal, often through a series of steps. Organization involves the ability to bring order to information and to appreciate main ideas or key concepts when learning or communicating information, either orally or in writing.

Organization of Materials- Another aspect of organization is the ability to order and organize things in one's environment, including maintenance of orderly work, play, and storage spaces (e.g., school desks, lockers, backpacks, and bedrooms).

Monitor- This can be viewed as consisting of two components: Task-oriented monitoring (work check habits) reflects a child's ability to check his/her own performance during or shortly after finishing a task to ensure that he/she has accurately or appropriately attained a desired goal. Self-monitoring reflects a child's awareness of the effect that his/her behavior has on others (Gioia, Isquith, Guy, & Kenworthy, 2000).

Assessment Using the BRIEF

Since the creation of the Behavior Rating Inventory of Executive Function (BRIEF), much research has been conducted to determine the efficacy of the instrument in effectively assessing executive function capacities. The BRIEF purports to measure specific aspects of executive functioning; however, many of the scales do not necessarily measure executive function capacities; rather, they measure constructs or behaviors. As McCloskey (Chapter 5, unpublished manuscript) points out, "Although the BRIEF rating scales are well-developed instruments, interpretation of the data collected is greatly constrained by both the Scale structure and the assignment of individual items to scales."

Denckla (2002) suggested that researchers pursue convergence among other measures and the clinical utility of the BRIEF. To achieve this end, emerging research has sought to identify the clinical utility in specific populations to determine if there is indeed convergence between performance-based measures and the BRIEF in the assessment of executive functions. For instance, Toplak, Bucciarelli, Jain, & Tannock (2010) examined an adolescent population with a clinical diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) to ascertain convergence between the BRIEF and performance-based measures of executive function. Parents and teachers were asked to complete BRIEF ratings and measures of inhibition, set-shifting, working memory and planning were included in the study. Findings suggested some convergence (albeit modest) between the BRIEF and performance based measures. This study found that the BRIEF ratings and parent and teacher ratings were better predictors of ADHD status than were performance based measures.

Semrud-Clikeman, Walkowiak, Wilkinson, & Butcher (2010) investigated BRIEF ratings and performance on measures of executive function for children with Asperger's Syndrome

(AS), ADHD-Combined Type (ADHD-C), and ADHD-Primarily Inattentive (ADHD-PI) type, along with controls. Findings suggested that children with AS and ADHD may have heterogenous EF profiles, thereby suggesting a need to identify these distinct patterns of performance to develop individualized interventions. More specifically, it was noted that children with AS and ADHD-C experienced more difficulties with emotional control and monitoring of behavior. Further, children with AS or ADHD-C were shown to demonstrate more difficulty shifting than did controls or students with ADHD-PI.   However, findings from this study also demonstrated no significant correlation for BRIEF ratings and individually administered direct measures of executive function (D-KEFS, WJ-III Cognitive). The authors suggest a multi-dimensional assessment be utilized for comprehensive evaluation of EF difficulties which includes both rating scales and direct measures.

Mcauley, Chen, Goos, Schachar, & Crosbie (2010) conducted a study to investigate if the BRIEF was more specifically a measure of behavioral disruption or a specific measure of executive function. The researchers examined the relationship of both the Behavior Regulation and Metacognition Indices of the BRIEF (parent and teacher ratings) with academic achievement and measures of inhibition, performance monitoring, and working memory. Although research has struggled to demonstrate a direct association between the BRIEF and more specific performance based measures, the authors postulate several hypotheses for the disparities often seen.

Much of the research conducted, and discussed here, reflects analyses utilizing the index or scale levels of the BRIEF in comparison with more direct assessments of executive function. Bobik (2008) utilized scale level analyses to determine clusters of performance based on prototypical teacher ratings of successful and unsuccessful students. Results of the study

suggested that teachers' ratings of prototypical successful students exhibited very few executive

function difficulties (as evidenced by scale T-Scores), but unsuccessful students exhibited

executive function difficulties in the clinically significant range on multiple scales. These

findings are consistent with previous research examining academic success and executive

function (Latzman, Elkovitch, Young, and Clark, 2009; Bull, Epsy, & Wiebe, 2008). However,

little information is readily available regarding those specific behaviors which are most likely

demonstrated by successful students and conversely, those specific behaviors which are most

likely endorsed for unsuccessful students.   This information can be most readily obtained

through explicit item level analyses.

Difficulties with various executive functions can vary across domains and arenas of

involvement. Although scale level interpretation yields statistically sound information in

determining difficulties with executive functioning, McCloskey (2010) points out "Barriers to

effective interpretation are evident in the labeling of some of the Scales." For instance, all of the

Emotional Control Scales items relate to difficulties with the use of various executive functions

(primarily Modulate and/or Inhibit) in the emotion domain. The Organization of Materials

Scales are distinguished from Plan/Organize Scales primarily by the domains of function and

arenas of involvement reflected in item descriptions rather than by the specific executive

functions difficulties; in fact, the Plan/Organize and Organization of Materials Scales represent a

collection of very diverse executive functions rather than a narrow set involving the Plan and

Organize functions. The Working Memory Scale is named for the way in which information is

handled within a time frame of reference rather than the Hold, Sustain, and Manipulate executive

functions that would be involved; the behavior description of only one item on the Working

Memory Scale could be linked to the Manipulate function thought to be critical to the effective

processing of information in the extended time frame that typically is referred to as working

memory. The non-specific nature of Scale item composition makes it difficult for clinicians to

move beyond a simple statement of the presence or absence of elevated scores for each scale and

a comparison of these score elevations across multiple raters. Although Scale level interpretation

can offer valuable information, clinicians who desire greater clarification of the executive

function's difficulties most likely to be represented by BRIEF results will need to extend their

interpretation efforts to the item level (McCloskey, 2010).

Item Level Analyses Using the BRIEF

When used in an appropriate manner, individual item interpretation can greatly increase

the validity and reliability of the assessment (McCloskey, 2010). Within the BRIEF manual,

normative data are not provided for the percentage of raters in the standardization that endorsed

the items as occurring "never, sometimes, or often" for the individual items. McCloskey notes

that this information is not provided because it is considered psychometrically "less adequate."

However, as he points out, the information gleaned from examining profiles of raters'

endorsements may yield more specific information regarding the raters' perceptions about a type

of behavior thought to be reflecting difficulties with the use of executive functions. McCloskey

further postulates that item level interpretation can be used as a tool for flexibly re-aligning items

into clusters of items that appear to be reflecting a specific pattern of behavior that may have

clinical relevance when determining intervention. Although it is an informal method, clustering

items has the potential to greatly increase both the validity and clinical utility of the data

collected with the rating scale. This is accomplished by realigning items into groupings that

reflect a greater degree of consistence and meaning in context of the individual assessment

(McCloskey, 2010). This information can then be utilized to conduct a quasi-functional

behavioral assessment, whereby the frequency, intensity, and duration of the specific behaviors reflecting the executive difficulties, coupled with an ability to identify the specific domains of functioning and arenas of involvement that are most greatly impacted.

Academic Achievement and Executive Functioning

Executive functions have been linked to the successful performance of a wide range of tasks, including academic performance as well as social/interpersonal skills. These skills are typically most apparent when the task demands of school increase and the onus of responsibility is shifted from teacher to student. This phenomenon is most readily apparent during the late elementary and middle school years. As the rigor of academics and the expectations for independence by parents and teachers increase, adolescents are faced with high levels of demand. Academic achievement and its relationship to executive function is an area continuing to be investigated in the literature. Recent studies are beginning to examine the link between executive functioning and academic achievement across subject areas. Latzman, Elkovitch, Young, and Clark (2009) investigated the link between executive functioning capacity and academic achievement in a group of typically developing male adolescents. Their findings suggested that aspects of executive functions (conceptual flexibility, monitoring, and inhibition) significantly and distinctly predicted performance on several academic areas (reading, mathematics, social studies, and science). More specifically, conceptual flexibility uniquely explained performance in both reading and science; monitoring uniquely predicted performance on measures of social studies and reading, and inhibition uniquely predicted performance on measures of mathematics and science. The findings of this study indicate that the various academic achievement areas may require and engage different executive functions.

Poor executive functions can lead to inadequate academic production in the areas of reading, mathematics, and writing. For example, problems in sustaining attention and monitoring the inflow of information can have adverse effects on reading comprehension, performing calculations, and producing extended written texts (Bobik, 2008). Bull, Epsy, & Wiebe (2008) investigated the cognitive predictors of math achievement with preschoolers and longitudinally assessed them at intervals of beginning and ending first grade and again at the end of third grade. Findings of the study suggested that good short-term memory, working memory, and, particularly, executive functioning skills provide children with an immediate advantage in the school learning environment. Children with poor functioning of these cognitive skills may make errors in a range of learning activities because of difficulty in remembering and carrying out instructions, inhibiting irrelevant information and staying focused on tasks; planning and monitoring individual steps of a task as it progresses are also affected (Bull, Epsy, & Wiebe, 2008).

Within the school environment, parents and teachers are often faced with the challenge of addressing academically capable students who are not meeting the expectations associated with the academic rigors because of difficulties often described as executive dysfunction. Research has suggested that inefficient executive function capacities may be related to "producing difficulties" (Denckla, 1996; 2007 as cited in McCloskey et al., 2009). From an academic perspective, these students have the skill base to complete the tasks, but the difficulties seen by their parents and teachers are more closely related to difficulties of executive functioning, not a skill deficit, but it is likely a performance deficit adversely affecting their progress in the curriculum.

Given the complex presentation of material in the middle school environment (i.e., note-taking, etc.), students are often required to invoke multiple executive processes to meet the curricular demands (both academically and behaviorally). However, given the differences in maturation of executive function development, many students may struggle to negotiate these tasks effectively. Given the effect of difficulties with executive function capacities and school performances, developing interventions to best address the needs of students is integral.

Intervention and Executive Functioning

There is little in the research regarding specific, direct intervention with students demonstrating executive weaknesses within the school environment. Intervention is crucial to students with various aspects of executive deficiencies to increase their functioning academically, socially, and to provide them with skills to develop independence and autonomy across the lifespan. Specific areas of intervention may address one or more of the commonly considered areas of executive functioning: response inhibition; cognitive flexibility; setting and achieving goals; task initiation; planning, organization, and time management; abstract reasoning/concept formation; working memory; attention control; controlling emotions and social behaviors; and self-monitoring and regulation/metacognition.

Reynolds (2008) recommends that aggressive retraining and development of self-regulatory skills and meta-cognitive skills is indicated until at least age 30 and possibly higher ages. He also noted that functional changes in EF should be expected until at least age 30 and possibly longer. Within the school environment, many of these interventions can be completed through general classroom management techniques or be more individualized, dependent upon the needs of the student.

Summary of Literature Review

The research examining various aspects of executive functions is vast, yet there is still much that is unknown. Researchers continue to discover the neurological, environmental, behavioral, and developmental progression of executive function capacities. In the past 25 years, one such discovery is the continual development of executive functions through adulthood and the neurological changes associated with the frontal lobes during adolescence. Horton (1994 as cited in Reynolds, 2008) notes that "Understanding the anatomical structure and behavioral functioning of the child and adolescent's brain serves to provide a valuable perspective on methods of clinical neuropsychological and school psychology assessments and/or interventions." Research has also begun to examine the interaction between executive function and academic achievement. More recent studies have begun to identify specific areas of executive function capacities related to a variety of academic tasks. With this in mind, and armed with the knowledge that adolescents are experiencing developmental and neurological changes with regard to executive function capacity, it is imperative to understand the behavioral outcomes and expectations typically associated with academic success and academic failure. The complex nature of development, both physically and neurologically, leaves adolescents at high risk for experiencing academic and behavioral struggles. In order to add to the tools utilized for assessment of executive functions, determining specific behavioral profiles that may be related to success and failure is critical to developing and implementing interventions that will best aid adolescents navigate the demands of the middle school environment. The present study attempts to extend the research conducted by Bobik (2008) by focusing on teacher perceptions of student behaviors for successful outcomes in academic functioning during the middle school years.

Research Question and Hypothesis

Question 1: Which specific items of the Behavior Rating Inventory of Executive Function (BRIEF) were most frequently endorsed as problematic for academically successful and academically unsuccessful students?

Question 2: To what extent do the items of the BRIEF differentiate successful versus unsuccessful students based on teacher ratings?

Question 3: When BRIEF items are reorganized using the McCloskey Model of Executive Functions, which executive functions are most frequently endorsed for academically successful and academically unsuccessful students?

Question 4: When BRIEF items are reorganized using the McCloskey Model of Executive Functions, which executive functions most effectively differentiate academically successful and academically unsuccessful students?

Question 5: What were the items most frequently endorsed by teachers as most highly problematic for academically unsuccessful students?

Question 6: What were the items most frequently endorsed by teachers as "Never" problematic for academically successful students?

Question 7: What items most frequently discriminated, with greatest effectiveness, between academically successful students and academically unsuccessful students?

Chapter 2

Method

Overview of Research Design

The current study utilized shelf-data to examine prototypical teacher ratings on the

Behavior Rating Inventory of Executive Functions (BRIEF) at the item level. These prototypical

ratings were completed by middle school teachers asked to rate typical characteristics exhibited

both by successful and by unsuccessful students. Previous research has utilized the data set to

identify profiles of performance at the scale and index levels (Bobik, 2008). This research study

sought to expand upon this previous research to determine if specific item-level analyses

produces distinct patterns based upon the successful/unsuccessful student dichotomy.

Specifically, this study wished to determine those items which were most frequently endorsed

and were specific to student failure (unsuccessful student ratings) and those items which were

least likely endorsed for those who are successful.

Measures

The BRIEF is an 86-item standardized questionnaire that according to the manual, takes

approximately 15 minutes to complete (Gioia et al., 2000). Each item response reflects the rater's

perception of everyday behavioral manifestations of executive functions in children. The BRIEF

items are negative indicators, meaning higher scores equate to lower levels of functioning. Items

are scored as: 1 = Never, 2 = Sometimes and 3 = Often; functioning is measured, based on a

teacher's 3-point rating of the observance of the target behaviors considered problematic. Each

item is related to a specific domain of executive functioning. These include the Inhibit, Shift,

Emotional Control, Initiate, Working Memory, Plan/Organize, Organization of Materials, and

Monitor scales. Raw scores are obtained using the three point scale and are then converted to T

scores, with corresponding percentiles, as an indication of the child's level of functioning, or

lack thereof. These T scores (mean of 50, standard deviation of 10) reflect an individual's score

in relation to the scores of others in the standardization sample. According to the manual (Gioia,

2000), a T score of 65 is suggestive of being clinically significant; the higher the score above the

cutoff of 65, the greater the dysfunction in specific executive functioning. BRIEF scores are

standardized according to age and gender. The BRIEF possesses strong psychometric properties.

Internal consistency ranged from .84 to .98 using Cronbach's alpha statistic. According to the

manual (Gioia, 2000), test-retest correlation ranged from .83 to .92 over an approximate three-

week period. Factor analyses supported a two-factor model of executive function showing high

correlations with other instruments that measure similar constructs and lower correlations where

associations are not expected.

As mentioned previously, the BRIEF provides global, index, and scale score based upon

ratings. At the composite level, the Global Executive Composite (GEC), scaled T-scores reflect

an overall level of functioning. The instrument is then broken down into two factors based upon

factor analyses which demonstrated high correlation to other instruments measuring similar

constructs and lower correlations when association with those measures were not expected. The

metacognitive index is built upon the Initiate, Working Memory, Plan-Organize, Organization of

Materials, and Monitor scales. The Behavioral Regulation Index comprises the Inhibit, Shift, and

Emotional Control scales.

Procedures

Archival, prototypical data were retrieved from an SPSS database for the purposes of this

study. Descriptive data such as date of birth, age, gender, teacher gender, grade and subject

taught were analyzed. T-scores were obtained for the BRIEF teacher ratings. There was no

contact between the student researcher and the informants. Archival data were extracted from

the Teacher form of The Behavior Rating Inventory of Executive Function (BRIEF), which was

utilized to elucidate ratings and profiles of prototypical successful and unsuccessful students.

Using the McCloskey Model of Executive Function, items from the BRIEF have been

assigned to one or more of the 31 self-regulation executive functions, using a rational behavior

analysis framework. This assignment yielded the following breakdown according to the

categories: Anticipate (1 items); Balance (1 item); Correct (2 items); Estimate time (2 items);

Execute (2 items); Flexible (3 items); Generate (3 items); Hold (5 items); Inhibit (9 items);

Initiate (4 items); Manipulate (1 item); Modulate (17 items); Monitor (11 items); Organize (4

items); Plan (1 item); Retrieve (4 items); Shift (3 items); Stop/Interrupt (4 items); and Sustain (8

items). Then a frequency count to determine the percentage of times each item was attributed to

an academically unsuccessful student was completed. Next, frequency counts were completed to

determine the number of times each item was attributed to academically unsuccessful students.

Differences between teacher ratings according to the items for academically successful and

unsuccessful students were calculated.

Chapter 3

Results

This chapter will present the data analyses of the teacher BRIEF ratings at the item level

for prototypical successful and unsuccessful middle school students, including frequency counts

for teacher endorsements of the items, cumulative percentage and difference scores for

endorsement of individual items for successful and unsuccessful students. This purpose of this

study was to examine the frequency of occurrence for individual items on the BRIEF to elucidate

those items which were most frequently endorsed for academically successful and unsuccessful

students. Further, the study sought to identify those items that were most discriminative of

academically successful versus unsuccessful students, based upon teacher ratings.

Demographic Data

The archival data were collected during workshops in which various teachers of middle

school students (grades 5-8) were asked to complete the Teacher form of the BRIEF based upon

characteristics of prototypical students. The sample included 63 teachers, and demographic

information collected included information about subject taught. The sample included 35 female

and 28 male teachers. Within the sample, 9 were special education teachers (14.3 percent) and

54 primarily taught regular education classes (85.7 percent). Ratings reflected prototypical

students age 10 through 15 years in grades 5 through 8. Each teacher was asked to complete two

BRIEF Teacher forms, a prototypical rating of an academically successful student and a

prototypical rating of an academically unsuccessful student.   Ratings were based upon each

teachers' recollections of a specific academically successful student and a specific academically

unsuccessful student that they had taught recently in their respective subject areas. The

prototypical BRIEF Teacher form ratings were analyzed at the item response level to answer

several research questions listed below.

   Question 1: Which specific items of the Behavior Rating Inventory of Executive Function

(BRIEF) were most frequently endorsed as problematic for academically successful students

and/or academically unsuccessful students?

   Frequency counts were collected, based upon teacher ratings for the 86 items of the

BRIEF. Tables 2-10 show the frequency of teacher endorsements for BRIEF Teacher form items

of each BRIEF Scale for the academically unsuccessful and successful prototypical students.

   Emotional Control Scale. Cumulative percentages of teacher ratings of the items of the

Emotional Control scale are shown in Table 2. Item ratings of "Sometimes" or "Often" were

much more frequent for unsuccessful students than for successful students for all 9 items of the

Emotional Control Scale.

Table 2

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Emotional Control Scale

Emotional Control Scale	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Mood is easily influenced by the situation	63	31	6	37	6	35	59	94
Overreacts to small problems	61	28	11	39	12	36	52	88
Reacts more strongly to situations than other children	80	14	6	20	12	37	51	88
Mood changes frequently	78	14	8	22	13	52	35	87
Gets upset too easily	71	26	3	29	14	29	57	86
Small events trigger big reactions	69	25	6	31	15	31	54	85
Has explosive, angry outbursts	71	23	6	29	17	32	51	83
Has outbursts for little reason	81	12	6	18	19	31	50	81
Angry or tearful outbursts are intense but end easily	86	11	3	14	31	41	28	69

   Monitor Scale. Cumulative percentages for teacher endorsements of items on the Monitor

scale of the BRIEF are displayed in Table 3. Teacher ratings revealed more frequent ratings of

problematic behaviors as occurring "Sometimes" or "Often" for unsuccessful students than for

successful students for all 10 items of the Monitor Scale.

Table 3

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Monitor Scale

Monitor Scale	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Work is sloppy	85	11	4	15	0	25	75	100
Has poor understanding of own strengths and weaknesses	74	20	6	26	0	29	71	100
Makes careless errors	62	35	3	38	3	46	51	97
Does not check work for mistakes	59	37	4	41	5	51	44	95
Does not notice when his/her behavior causes negative reactions	72	22	6	28	5	40	55	95
Is unaware of own behavior when in a group	75	22	3	25	5	17	78	95
Is unaware of how his/her behavior affects or bothers others	72	26	2	28	6	26	68	94
Leaves work incomplete	80	15	5	20	8	39	53	92
Talks or plays too loudly	63	25	12	37	13	42	45	87
Does not realize that certain actions bother others	72	23	5	28	17	28	55	83

Initiate Scale. Table 4 shows the cumulative percentages of teacher endorsements for the items of the Initiate scale. On this scale, teacher ratings reflected higher levels of endorsement of frequency of occurrence of problematic behavior for unsuccessful students than for successful students for all 7 items.

Table 4

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Initiate Scale

Initiate Scale	Successful				Unsuccessful			
	N	S	O	S+O	N	S	O	S+O
Has trouble thinking of a different to solve a problem when stuck	69	29	2	31	0	35	65	100
Is not a self-starter	77	18	5	23	5	29	66	95
Does not show creativity in solving a problem	79	18	3	21	5	31	64	95
Does not take initiative	75	20	5	25	5	23	72	95
Has problems coming up with new ways of solving a problem	71	24	5	29	9	31	60	91
Has trouble getting started on homework or chores	80	15	5	20	9	25	66	91
Needs to be told to begin a task even when willing	75	20	5	25	15	29	56	85

Organization of Materials Scale. The cumulative percentages of teacher ratings for successful and unsuccessful students on the Organization of Materials Scale are shown in Table 5. For this scale, all of the items were rated as "Sometimes" or "Often" problematic for a much larger percentage of unsuccessful students than for successful students.

Table 5

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Organization of Materials Scale

Organization of Materials Scale	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Leaves a trail of belongings whenever he/she goes	91	6	3	9	2	18	80	98
Has a messy closet	80	14	6	20	11	37	52	89
Loses things	83	12	5	17	14	48	38	86
Leaves messes that others have to clean up	79	18	3	21	14	54	32	86
Cannot find things in room or school desk	83	14	3	17	17	38	45	83
Backpack is disorganized	74	23	3	26	21	34	45	79
Cannot find things at home	84	13	3	16	31	33	36	69

   Plan and Organize Scale. Table 6 reflects the cumulative percentages of teacher

endorsements for items of the Plan and Organize Scale of the BRIEF. Each of the 10 items

yielded higher "Sometimes" and "Often" problematic ratings by teachers for unsuccessful

students than for successful students.

Table 6

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Plan/Organize Scale

Plan/Organize Scale	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Becomes overwhelmed by large assignments	72	22	6	28	2	23	75	98
Starts assignments or chores at the last minute	80	17	3	20	5	26	69	95
Forgets to hand in homework, even when completed	75	20	5	25	6	31	63	94
Has good ideas but does not get the job done (lacks follow-through)	79	18	3	21	6	40	54	94
Underestimates time needed to finish tasks	79	18	3	21	9	22	69	91
Does not plan ahead for assignments	80	15	5	20	10	45	45	90
Has good ideas but cannot get them on paper	71	26	3	29	11	55	34	89
Gets caught up details and misses the big picture	72	22	6	28	13	42	45	87
Does not bring home homework, assignment sheets, etc.	79	18	3	21	15	43	42	85
Written work is poorly organized	87	8	5	13	19	46	35	81

Shift Scale. Table 7 reflects the cumulative percentages of teacher endorsements for items of the Shift Scale of the BRIEF. For the Shift scale of the BRIEF, cumulative percentages of teacher endorsements of "Sometimes" and "Often" reflected higher ratings of problematic behavior for unsuccessful students than for successful students on all items. It should be noted, however, that teacher endorsements of problematic behavior for some items were also relatively high for successful students; teacher ratings of "Sometimes" or "Often" occurred 48%, 39%, 36%, 34% or 32% of the time for 8 of the 10 items.

Table 7

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Shift Scale

Shift Items	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Has trouble getting used to new situations (classes, groups, friends)	77	18	5	23	6	42	52	94
Gets stuck on one topic or activity	69	28	3	31	6	34	60	94
Thinks too much about the same topic	74	21	5	26	12	48	40	88
Is disturbed by a change of teacher or class	61	30	9	39	17	55	28	83
Cannot get a disappointment, scolding, or insult off his/her mind	52	42	6	48	19	41	40	81
Acts upset by a change in plans	68	25	7	32	19	51	30	81
Becomes upset with new situations	68	27	5	32	23	45	32	77
After having a problem, will stay disappointed for a long time	66	28	6	34	25	34	41	75
Resists or has trouble accepting a different way to solve a problem	64	30	6	36	26	43	31	74
Resists change of routines	68	26	6	32	27	35	38	73

Working Memory Scale. As shown in Table 8, cumulative percentages of teacher endorsements for specific items of the Working Memory Scale of the BRIEF reflected the fact that most items were rated as problematic more frequently for unsuccessful students than for successful students. None of the items was rated beyond the average range for prototypically successful students.

Table 8

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the BRIEF Working Memory Scale

Working Memory Items	Successful				Unsuccessful			
	N	S	O	S+O	N	S	O	S+O
Needs help from an adult to stay on task	68	26	6	32	0	32	68	100
Is easily distracted by noises, activity, sights, etc.	66	25	9	34	2	26	72	98
Has a short attention span	68	22	10	32	3	28	69	97
Has trouble finishing tasks	77	21	2	23	5	20	75	95
Has trouble concentrating on chores, schoolwork, etc.	75	22	3	25	6	31	63	94
Has trouble with chores or tasks that have more than one step	83	12	5	17	11	51	38	89
When given three things to do, remembers only the first or last	74	23	3	26	13	47	40	87
Forgets what he/she was doing	83	12	5	17	17	41	42	83
Has trouble remembering things, even for a few minutes	89	8	3	11	22	37	41	78
When sent to get something, forgets what he/she is supposed to get	86	11	3	14	32	46	22	68

BRIEF Inhibit Scale. Teacher endorsements of the items of the Inhibit Scale are displayed in Table 9. Each of the items was rated to be more problematic as reflected by teacher endorsements of "Sometimes" and "Often" for unsuccessful students than for successful students. Teacher ratings of these items did not reflect any elevated ratings for the large majority of successful students.

Table 9

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for
Academically Successful and Academically Unsuccessful Students for the BRIEF Inhibit Scale

Inhibit Scale Items	*Successful*				*Unsuccessful*			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Does not think before doing	71	25	4	29	3	29	68	97
Gets in trouble if not supervised by an adult	75	22	3	25	6	34	60	94
Needs to be told to stop that	61	30	9	39	8	22	70	92
Interrupts others	71	20	9	29	8	18	74	92
Is impulsive	71	19	10	29	8	20	72	92
Gets out of seat at wrong time	71	23	6	29	9	22	69	91
Has trouble putting the brakes on his/her actions	77	17	6	23	9	31	60	91
Gets out of control more than friends	8	9	6	15	11	31	58	89
Acts too wild or out of control	77	17	6	23	12	29	59	88
Does not think of consequences before acting	69	26	5	31	20	26	54	80

BRIEF Extra Items. Cumulative percentages of teacher endorsements for those items that are part of the BRIEF but not included in any of the aforementioned scales are displayed in Table 10. For unsuccessful students, most of the items were rated as problematic more frequently for unsuccessful students than for successful students.

Table 10

Frequency of Teacher Item Endorsements of "Never" "Sometimes" and "Often" for Academically Successful and Academically Unsuccessful Students for the Extra Items of the BRIEF

Extra Items	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Is fidgety	75	16	9	25	5	26	69	95
Blurts things out	66	22	12	34	5	23	72	95
Doesn't connect doing tonight's homework with grades	87	8	5	13	6	29	65	94
Tests poorly even when knows correct answers	83	14	3	17	8	26	66	92
Does not come prepared for class	83	9	8	17	8	26	66	92
Does not finish long-term project	85	11	4	15	11	41	48	89
Has poor handwriting	83	14	3	17	14	34	52	86
Has trouble moving from one activity to another	77	21	2	23	14	40	46	86
Has trouble waiting for turn	71	22	7	29	15	40	45	85
Talks at the wrong time	63	25	12	37	15	48	37	85
Has to be closely supervised	72	26	2	28	17	33	50	83
Cannot stay on the same topic when talking	83	15	2	17	20	35	45	80
Says the same thing over and over	89	5	6	11	26	31	43	74

Summary of Frequency Counts. Table 11 shows a summary of the distribution of the

frequency of teacher item endorsements of "Never" for academically successful students by

BRIEF scale. Frequency counts of percentage of teachers endorsing items as occurring "Never"

for academically successful students typically ranged from 60% to 89% for all of the BRIEF

Scales. The highest concentration of items endorsed as "Never" by 80-89% of teachers came

from the extra items that were not included on any specific BRIEF scale.

Table 11

Summary of "Never" Item Endorsements by teachers for academically successful students by BRIEF Scale

Scales	90-100	80-89	70-79	60-69	<60
Emotional Control	0	3	3	3	0
Inhibit	0	2	5	2	1
Initiate	0	1	5	1	0
Organization of Materials	1	4	2	0	0
Planning and Organization	0	3	7	0	0
Shift	0	0	2	7	1
Working Memory	0	4	3	3	0
Inhibit	0	1	7	2	0
Extra Items	0	7	4	2	0

Summary of BRIEF Scale item endorsement for unsuccessful students. Table 12 shows a summary of the distribution of the frequency of teacher item endorsements of "Sometimes" or "Often" for academically unsuccessful students by BRIEF scale. Frequency counts of percentage of teachers endorsing items as occurring "Sometimes" or "Often" for academically unsuccessful students typically ranged from 70% to 100% for all of the BRIEF Scales. The lowest concentration of items endorsed as "Sometimes" or "Often" occurred with the Shift Scale.

Table 12

Summary of "Sometimes" or "Often" Item Endorsements by teachers for academically
unsuccessful students by BRIEF Scale

Scales	90-100	80-89	70-79	60-69	<60
Emotional Control	1	7	0	1	0
Inhibit	8	2	0	0	0
Initiate	6	1	0	0	0
Organization of Materials	1	4	1	1	0
Planning and Organization	6	4	0	0	0
Shift	2	4	4	0	0
Working Memory	5	3	1	1	0
Inhibit	7	3	0	0	0
Extra Items	5	7	1	0	0

Question 2: To what extent do the items of the BRIEF differentiate successful versus unsuccessful students based on teacher ratings?

The second research question examined the differences between each teacher's ratings of successful and unsuccessful students for each item within the BRIEF scales and for the extra items not included in any of the scales. Tables 13-22 present the cumulative percentages of the differences between teacher ratings of unsuccessful and successful students for each item of each respective scale of the BRIEF. Table values indicate differences between teacher ratings of academically unsuccessful and academically successful students as follows:

- A value of 2 indicates that a teacher rated the academically unsuccessful student as "Often" exhibiting the problematic behavior described by the item but rating the academically successful student as "Never" exhibiting the problematic behavior described by the item.

- A value of 1 indicates one of two possibilities: 1) that a teacher rated the academically unsuccessful student as "Sometimes" exhibiting the problematic behavior and rated the academically successful student as "Never" exhibiting the problematic behavior described by the item, or 2) that a teacher rated the academically unsuccessful student as "Often" exhibiting the problematic behavior and rated the academically successful student as "Sometimes" exhibiting the problematic behavior described by the item.

- A value of 0 indicates that a teacher rated the academically unsuccessful student and the academically successful student identically; e.g., both were rated as "Never" exhibiting the problematic behavior.

- A value of -1 indicates one of two possibilities: 1) that a teacher rated the
  academically unsuccessful student as "Never" exhibiting the problematic behavior
  and rated the academically successful student as "Sometimes" exhibiting the
  problematic behavior described by the item, or that a teacher rated the
  academically unsuccessful student as "Sometimes" exhibiting the problematic
  behavior and rated the academically successful student as "Often" exhibiting the
  problematic behavior described by the item.

- A value of -2 indicates that a teacher rated the academically unsuccessful student
  as "Never" exhibiting the problematic behavior described by the item but rated
  the academically successful student as "Often" exhibiting the problematic
  behavior described by the item.

The more frequently that teacher ratings of an item provided contrasts of 2 or 1, the

greater was the item's capacity for discriminating between academically unsuccessful students

and academically successful students.

Emotional Control Scale. Table 13 shows the cumulative percentages of the frequency of

score differences between teachers' ratings of academically successful and academically

unsuccessful students for each item of the Emotional Control Scale of the BRIEF. Many items

of this scale reflected high levels of difference between teachers' ratings of academically

unsuccessful students and academically successful students.

Table 13

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Emotional Control Scale

Emotional Control Items	2+1	2	1	0	-1	-2
Gets upset too easily	78	37	41	17	5	0
Reacts more strongly to situations than other children	75	41	34	20	5	0
Has outbursts for little reason	74	37	37	23	3	0
Mood is easily influenced by the situation	74	37	37	24	2	0
Small events trigger big reactions	72	34	38	25	2	1
Mood changes frequently	70	26	44	27	3	0
Overreacts to small problems	69	27	42	25	6	0
Has explosive, angry outbursts	67	35	32	28	5	0
Angry or tearful outbursts are intense but end easily	58	24	34	39	3	0

Monitor. Many items of the Monitor scale showed a high frequency of differentiation between successful and unsuccessful students. Frequency counts are shown in Table 14. For many of the items in this scale the large majority of the teachers' ratings of successful and unsuccessful students discriminated effectively; that is, it produced differences of +1 or +2.

Table 14

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Monitor Scale

Monitor Items	2+1	2	1	0	-1	-2
Leaves work incomplete	92	60	32	6	2	0
Has poor understanding of own strengths and weaknesses	85	45	40	12	3	0
Makes careless errors	83	46	37	17	0	0
Does not check work for mistakes	82	50	32	15	3	0
Work is sloppy	80	40	40	17	3	0
Is unaware of how his/her behavior affects or bothers others	78	33	45	14	8	0
Does not realize that certain actions bother others	74	39	35	20	6	0
Talks or plays too loudly	72	49	23	19	6	3
Is unaware of own behavior when in a group	72	34	38	23	5	0
Does not notice when his/her behavior causes negative reactions	69	41	28	28	3	0

Initiate. Cumulative percentages of frequencies for the item differences of teacher ratings for successful and unsuccessful students are displayed in Table 15. For all of the items in this scale, a large majority of the teachers' ratings of successful and unsuccessful students discriminated effectively; that is, it produced differences of +1 or +2.

Table 15

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Initiate Scale

Initiate Items	2+1	2	1	0	-1	-2
Needs to be told to begin a task even when willing	87	48	39	13	0	0
Is not a self-starter	86	55	31	13	1	0
Has trouble getting started on homework or chores	86	52	34	12	2	0
Does not take initiative	83	37	46	14	3	0
Does not show creativity in solving a problem	81	35	46	17	2	0
Has problems coming up with new ways of solving a problem	80	34	46	20	0	0
Has trouble thinking of a different to solve a problem when stuck	79	40	39	21	0	0

Organization of Materials. The cumulative percentages of teachers' ratings differences for items of the Organization of Materials scale are shown in Table 16.   For all of the items of this scale, a majority of teachers' ratings discriminated effectively between academically successful and academically unsuccessful students.

Table 16

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Organization of Materials Scale

Organization of Materials Items	2+1	2	1	0	-1	-2
Backpack is disorganized	79	52	27	17	2	2
Cannot find things at home	79	31	48	14	5	2
Cannot find things in room or school desk	75	32	43	21	2	2
Loses things	68	34	34	26	6	0
Has a messy closet	67	37	30	31	2	0
Leaves messes that others have to clean up	66	35	31	31	3	0
Leaves a trail of belongings whenever he/she goes	64	33	31	33	1	2

Planning and Organization. Table 17 shows the cumulative percentages of teachers'

ratings differences for the items contained in the Planning and Organization scale of the BRIEF.

For all of the items of this scale, a majority of teachers' ratings discriminated effectively between

academically successful and unsuccessful students, with frequencies of 80 % or more occurring

for 5 of the 9 items.

Table 17

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Plan/Organize Scale

Plan/Organize Items	2+1	2	1	0	-1	-2
Does not plan ahead for assignments	91	59	32	9	0	0
Does not bring home homework, assignment sheets, etc.	91	63	28	9	0	0
Starts assignments or chores at the last minute	84	42	42	16	0	0
Becomes overwhelmed by large assignments	82	43	39	17	1	0
Forgets to hand in homework, even when completed	82	41	41	10	3	5
Underestimates time needed to finish tasks	78	36	42	17	3	2
Has good ideas but does not get the job done (lacks follow-through)	77	25	52	20	3	0
Gets caught up details and misses the big picture	71	25	46	28	1	0
Written work is poorly organized	65	2	63	20	14	1
Has good ideas but cannot get them on paper	64	26	38	31	5	0

Shift. Table 18 shows the cumulative percentages of teachers' ratings differences for the BRIEF items on the Shift scale. Although a majority of teachers' ratings discriminated effectively for each of these items, the frequencies of teachers whose ratings discriminated effectively were relatively lower for the items of this scale than for most of the other scales, with only two of the 10 items reflecting frequencies above 70%.

Table 18

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Shift Scale

Shift Items	2+1	2	1	0	-1	-2
After having a problem, will stay disappointed for a long time	72	38	34	23	5	0
Resists or has trouble accepting a different way to solve a problem	71	27	44	24	5	0
Thinks too much about the same topic	68	19	49	26	6	0
Has trouble getting used to new situations (classes, groups, friends)	67	22	45	27	6	0
Becomes upset with new situations	64	23	41	28	8	0
Cannot get a disappointment, scolding, or insult off his/her mind	62	5	57	35	3	0
Gets stuck on one topic or activity	61	25	36	29	8	2
Resists change of routines	58	20	38	34	8	0
Is disturbed by a change of teacher or class	56	20	36	27	14	3
Acts upset by a change in plans	55	29	26	42	3	0

Working Memory. Cumulative percentages of teachers' ratings differences for items of the Working Memory scale of the BRIEF are reflected in Table 19. For all items of this scale, a majority of teachers' ratings discriminated effectively between teacher ratings of successful and unsuccessful students, with 5 of the 10 items reflecting frequencies of 85% or more.

Table 19

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Working Memory Scale

Working Memory Items	2+1	2	1	0	-1	-2
Has trouble concentrating on chores, schoolwork, etc.	90	45	45	6	4	0
Has trouble finishing tasks	89	58	31	9	2	0
Is easily distracted by noises, activity, sights, etc.	88	43	45	9	3	0
Needs help from an adult to stay on task	86	43	43	14	0	0
Has a short attention span	85	42	43	12	3	0
When give three things to do, remembers only the first or last	75	30	45	19	6	0
Has trouble with chores or tasks that have more than one step	75	34	41	22	3	0
Forgets what he/she was doing	74	32	42	23	3	0
Has trouble remembering things, even for a few minutes	71	36	35	29	0	0
When sent to get something, forgets what he/she is supposed to get	59	17	42	38	3	0

Inhibit. Table 20 shows the cumulative percentages of teachers' ratings differences for items contained in the Inhibit Scale of the BRIEF. For all of the items, a majority of teachers' ratings discriminated effectively between successful and unsuccessful students, with 4 of the 10 items reflecting frequencies above 80%.

Table 20

Cumulative Percentages of Teacher Rating Item Differences for the BRIEF Inhibit Scale

Inhibit Items	2+1	2	1	0	-1	-2
Does not think before doing	88	45	43	11	1	0
Gets in trouble if not supervised by an adult	86	45	41	9	5	0
Gets out of control more than friends	83	49	34	12	3	2
Has trouble putting the brakes on his/her actions	81	46	35	14	3	2
Gets out of seat at wrong time	79	51	28	19	1	1
Interrupts others	78	55	23	17	3	2
Needs to be told to stop that	78	44	34	17	2	3
Acts too wild or out of control	78	43	35	19	2	1
Is impulsive	77	57	20	17	3	3
Does not think of consequences before acting	69	40	29	22	8	1

Extra Items. Cumulative percentages of teachers' ratings differences for BRIEF items not included in any of the 8 scales are shown in Table 21. For all of the items, a majority of teachers' ratings discriminated effectively between successful and unsuccessful students, with 4 or the 13 items reflecting frequencies above 80%.

Table 21

Cumulative Percentages of Teacher Rating Item Differences for the Extra Items not included on the BRIEF Scales

Extra Items	2+1	2	1	0	-1	-2
Blurts things out	91	63	28	9	0	0
Doesn't connect doing tonight's homework with grades	90	57	33	8	2	0
Says the same thing over and over	86	55	31	11	1	2
Has trouble waiting for turn	82	52	30	12	3	3
Is fidgety	79	54	25	17	3	1
Tests poorly even when he or she knows correct answers	78	35	43	20	2	0
Has trouble moving from one activity to another	77	34	43	17	5	1
Does not finish long-term projects	76	44	32	17	5	2
Has poor handwriting	76	44	32	17	5	2
Cannot stay on the same topic when talking	75	35	40	20	5	0
Has to be closely supervised	75	40	35	20	5	0
Talks at the wrong time	71	49	22	20	6	3
Does not come prepared for class	71	49	22	20	6	3

Summary of teacher rating item differences by BRIEF Scale. Table 22 shows the

frequency of the cumulative percentages of teachers' item ratings of successful and unsuccessful

students that discriminated effectively; that is, that they produced differences of +1 or +2 by

BRIEF scale. For example, the table shows that for 6 of the items of the Emotional Control

Scale, the ratings from 70-79% of the teachers effectively discriminated between academically

successful and academically unsuccessful students by reflecting a difference score of +2 0r +1.

Frequencies of percentages of teacher item ratings that discriminated effectively were highest for

the Initiate and Working Memory Scales, whereas the lowest frequencies of percentages of

teacher item ratings that discriminated effectively were evidenced on the Shift and Organization

of Materials Scales.

Table 22

Summary of Teacher Rating Item Differences by BRIEF Scale

BRIEF Scales	90-100	80-89	70-79	60-69	<60
Emotional Control	0	0	6	2	1
Monitor	1	4	4	1	0
Initiate	0	6	1	0	0
Organization of Materials	0	0	3	4	0
Planning and Organization	2	3	3	2	0
Shift	0	0	2	5	3
Working Memory	1	4	4	0	1
Inhibit	0	4	5	1	0
Extra Items	2	2	9	0	0

Question 3: When BRIEF items are reorganized using the McCloskey Model of Executive Functions which executive functions categories are most frequently endorsed as problematic for academically successful and/or academically unsuccessful students?

The third research question examined the frequency of occurrence for teacher endorsement of items, based upon the McCloskey Model of Executive Functions to determine those executive functions categories that were considered most problematic for students. These frequencies, organized according to the six Clusters within the McCloskey Model of Executive Functions, are shown in tables 23 through 30.

MEFS Category within the Attention Cluster. Table 23 displays cumulative frequencies of teacher ratings of the BRIEF items and the corresponding McCloskey Model Attention Cluster of executive functions. For this cluster, teacher ratings of each item reflected higher levels of problematic behavior for unsuccessful students.   Ratings for the items within this cluster did not yield ratings of problematic behavior for successful students.

Table 23

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"
Organized by MEFS Category within the Attention Cluster for Academically Successful and
Academically Unsuccessful Students

Attention Cluster (MEFS category)	*Successful*				*Unsuccessful*			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Needs help from an adult to stay on task (Sustain)	68	26	6	32	0	32	68	100
Is easily distracted by noises, activity, sights, etc. (Sustain)	66	25	9	34	2	26	72	98
Has a short attention span (Sustain)	68	22	10	32	3	28	69	97
Does not finish long-term projects (Sustain)	85	11	4	15	5	26	69	95
Has trouble finishing tasks (Sustain)	77	21	2	23	5	20	75	95
Has trouble concentrating on chores, schoolwork, etc. (Sustain)	75	22	3	25	6	31	63	94
Has good ideas but does not get the job done (lacks follow-through) (Sustain)	79	18	3	21	11	55	34	89
Cannot stay on the same topic when talking (Sustain)	83	15	2	17	20	35	45	80

   MEFS Categories within the Engagement Cluster. Table 24 displays cumulative frequencies of teacher ratings of the BRIEF items and the items corresponding to the McCloskey Model Engagement Cluster of executive functions. For this cluster, teacher ratings of each item reflected higher levels of problematic behavior for unsuccessful students. Ratings for the items within this cluster did not yield ratings of problematic behavior for successful students.

Table 24

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"
Organized by MEFS Category within the Engagement Cluster for Academically Successful and
Academically Unsuccessful Students

Engagement Cluster (MEFS category)	*Successful*				*Unsuccessful*			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Needs to be told to begin a task even when willing (Initiate)	75	20	5	25	0	35	65	100
Has trouble waiting for turn (Inhibit)	71	22	7	29	5	29	66	95
Is fidgety (Inhibit)	75	16	9	25	5	31	64	95
Is not a self-starter (Initiate)	77	18	5	23	5	23	72	95
Gets in trouble if not supervised by an adult (Inhibit)	75	22	3	25	6	34	60	94
Has trouble getting started on homework or chores (Initiate)	80	15	5	20	6	26	68	94
Has trouble moving from one activity to another (Shift)	77	21	2	23	6	34	60	94
Gets stuck on one topic or activity (Shift)	69	28	3	31	6	42	52	94
Interrupts others (Inhibit)	71	20	9	29	8	18	74	92
Is impulsive (Inhibit)	71	19	10	29	8	20	72	92
Does not take initiative (Initiate)	75	20	5	25	8	39	53	92
Needs to be told to stop that (Stop/Interrupt)	61	30	9	39	8	22	70	92
Blurts things out (Inhibit)	66	22	12	34	9	31	60	91
Talks at the wrong time (Inhibit)	63	25	12	37	9	25	66	91
Has trouble putting the brakes on his/her actions (Stop/Interrupt)	77	17	6	23	9	31	60	91

Cannot get a disappointment, scolding, or insult off his/her mind (Stop/Interrupt)	52	42	6	48	10	45	45	90
Has to be closely supervised (Inhibit)	72	26	2	28	15	29	56	85
Has trouble getting used to new situations (classes, groups, friends) (Flexible)	77	18	5	23	17	55	28	83
Resists or has trouble accepting a different way to solve a problem (Flexible)	64	30	6	36	19	46	35	81
Resists change of routines (Flexible)	68	26	6	32	19	51	30	81
Does not think of consequences before acting (Inhibit)	69	26	5	31	20	26	54	80
Says the same thing over and over (Shift)	89	5	6	11	25	34	41	75
Thinks too much about the same topic (Stop/Interrupt)	74	21	5	26	27	35	38	73

MEFS Categories within the Evaluate Cluster. Cumulative frequencies of teacher ratings

of the BRIEF items and the corresponding McCloskey Model Evaluate Cluster of executive

functions are shown in Table 25. Within this cluster, teacher ratings of each item reflected

higher levels of problematic behavior for unsuccessful students.   Ratings for the items within

this cluster did not yield ratings of problematic behavior for successful students.

Table 25

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"
Organized by MEFS Category within the Evaluate Cluster for Academically Successful and
Academically Unsuccessful Students

Evaluate Cluster (MEFS category)	*Successful*				*Unsuccessful*			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Makes careless errors (Monitor)	62	35	3	38	0	29	71	100
Leaves work incomplete (Monitor)	80	15	5	20	0	25	75	100
Does not check work for mistakes (Monitor)	59	37	4	41	5	17	78	95
Mood is easily influenced by the situation (Modulate)	63	31	6	37	6	35	59	94
Becomes overwhelmed by large assignments (Modulate)	72	22	6	28	6	31	63	94
Has poor understanding of own strengths and weaknesses (Monitor)	74	20	6	26	6	29	65	94
Talks or plays too loudly (Modulate)	63	25	12	37	8	26	66	92
Gets out of seat at wrong time (Monitor)	71	23	6	29	9	22	69	91
Gets out of control more than friends (Modulate)	85	9	6	15	11	31	58	89
Work is sloppy (Monitor)	85	11	4	15	11	41	48	89
Forgets to hand in homework, even when completed (Monitor)	75	20	5	25	11	37	52	89
Overreacts to small problems (Modulate)	61	28	11	39	12	36	52	88
Reacts more strongly to situations than other children (Modulate)	80	14	6	20	12	37	51	88

Acts too wild or out of control (Modulate)	77	17	6	23	12	29	59	88
After having a problem , will stay disappointed for a long time (Modulate)	66	28	6	34	12	48	40	88
Mood changes frequently (Modulate)	78	14	8	22	13	52	35	87
Is unaware of how his/her behavior affects or bothers others (Monitor)	72	26	2	28	13	42	45	87
Gets upset too easily (Modulate)	71	26	3	29	14	29	57	86
Does not realize that certain actions bother others (Monitor)	72	23	5	28	14	34	52	86
Gets caught up details and misses the big picture (Balance)	72	22	6	28	15	43	42	85
Small events trigger big reactions (Modulate)	69	25	6	31	15	31	54	85
Is unaware of own behavior when in a group (Monitor)	75	22	3	25	15	40	45	85
Has explosive, angry outbursts (Modulate)	71	23	6	29	17	32	51	83
Does not notice when his/her behavior causes negative reactions (Monitor)	72	22	6	28	17	28	55	83
Has outbursts for little reason (Modulate)	81	12	6	18	19	31	50	81
Becomes upset with new situations (Modulate)	68	27	5	32	19	41	40	81
Leaves messes that others have to clean up (Correct)	79	18	3	21	21	34	45	79
Is disturbed by a change of teacher or class (Modulate)	61	30	9	39	23	45	32	77
Acts upset by a change in plans (Modulate)	68	25	7	32	26	43	31	74

Leaves a trail of belongings whenever he/she goes (Correct)	91	6	3	9	31	33	36	69
Angry or tearful outbursts are intense but end easily (Modulate)	86	11	3	14	31	41	28	69

MEFS Categories within the Solution Cluster. Table 26 shows the cumulative

frequencies of teacher ratings of the BRIEF items and the corresponding McCloskey Model

Solution Cluster of executive functions. Within this cluster, teacher ratings of each item

reflected high levels problematic behavior for unsuccessful students.   Ratings yielded no

problematic behaviors for successful students.

Table 26

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"

Organized by MEFS Category within the Solution Cluster for Academically Successful and

Academically Unsuccessful Students

Solution Cluster (MEFS category)	Successful				Unsuccessful			
	N	S	O	S+O	N	S	O	S+O
Does not plan ahead for assignments (Plan)	80	15	5	20	2	23	75	98
Does not think before doing (Anticipate)	71	25	4	29	3	29	68	97
Has problems coming up with new ways of solving a problem (Generate)	71	24	5	29	3	46	51	97
Does not connect doing tonight's homework with grades (Anticipate)	87	8	5	13	5	26	69	95
Does not show creativity in solving a problem (Generate)	79	18	3	21	5	51	44	95
Has trouble thinking of a different way to solve a problem when stuck (Generate)	69	29	2	31	5	40	55	95
Does not come prepared for class (Organize)	83	9	8	17	5	23	72	95
Starts assignments or chores at the last minute (Estimate Time)	80	17	3	20	6	40	54	94
Backpack is disorganized (Organize)	74	23	3	26	8	26	66	92
Written work is poorly organized (Organize)	87	8	5	13	9	22	69	91
Underestimates time needed to finish tasks (Estimate Time)	79	18	3	21	13	42	45	87
Has a messy closet (Organize)	80	14	6	20	17	38	45	83

MEFS Categories within the Efficiency Cluster. Table 27 reflects the cumulative

frequencies of teacher ratings of the BRIEF items and the corresponding McCloskey Model

Efficiency Cluster of executive functions. Within this cluster, teacher ratings of each item

reflected higher levels of problematic behavior for unsuccessful students.   Teachers did not

endorse the items as being problematic for successful students.

Table 27

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"

Organized by MEFS Category within the Efficiency Cluster for Academically Successful and

Academically Unsuccessful Students

Solution Cluster (MEFS category)	Successful				Unsuccessful			
	N	*S*	*O*	*S+O*	*N*	*S*	*O*	*S+O*
Tests poorly even when he/she knows correct answers (Execute)	83	14	3	17	14	40	46	86
Has poor handwriting (Execute)	83	14	3	17	17	33	50	83

MEFS Category within the Recollection cluster. Table 28 shows the cumulative

frequencies of teacher ratings of the BRIEF items and the corresponding McCloskey Model

Recollection cluster of executive functions. Teacher ratings of each item within this cluster

reflected higher levels of problematic behavior for unsuccessful students.   Ratings for the items

within this cluster did not yield ratings of problematic behavior for successful students.

Table 28

Frequency of Teacher BRIEF Item Endorsements of "Never" "Sometimes" and "Often"

Organized by MEFS Category within the Recollection Cluster for Academically Successful and

Academically Unsuccessful Students

Recollection Cluster (MEFS category)	Successful				Unsuccessful			
	N	S	O	S+O	N	S	O	S+O
Does not bring home homework, assignment sheets, etc. (Retrieve)	79	18	3	21	2	18	80	98
Has trouble with chores or tasks that have more than one step (Hold)	83	12	5	17	11	51	38	89
When give three things to do, remembers only the first or last (Hold)	74	23	3	26	13	47	40	87
Has good ideas but cannot get them on paper (Manipulate)	71	26	3	29	14	54	32	86
Cannot find things in room or school desk (Retrieve)	83	14	3	17	14	48	38	86
Cannot find things at home (Retrieve)	84	13	3	16	15	48	37	85
Forgets what he/she was doing (Hold)	83	12	5	17	17	41	42	83
Has trouble remembering things, even for a few minutes (Hold)	89	8	3	11	22	37	41	78
Loses things (Retrieve)	83	12	5	17	26	31	43	74
When sent to get something, forgets what he/she is supposed to get (Hold)	86	11	3	14	32	46	22	68

       MEFS Summary of Academically Successful Students. Table 29 shows a summary of the distribution of the frequency of teacher item endorsements of "Never" for academically successful students by MEFS Executive Functions Categories. Frequency counts of percentage of teachers endorsing items as occurring "Never" for academically successful students typically ranged from 60% to 89% for all of the MEFS Executive Functions Categories.

Table 29

Summary of "Never" Item Endorsements by teachers for academically successful students by MEFS Executive Functions Categories

MEFS Category	Cumulative Frequency Percentages				
	90-100	80-89	70-79	60-69	<60
Anticipate	0	1	1	0	0
Balance	0	0	1	0	0
Correct	1	0	1	0	0
Estimate Time	0	1	1	0	0
Execute	0	2	0	0	0
Flexible	0	0	1	2	0
Generate	0	0	2	1	0
Hold Information	0	4	1	0	0
Inhibit	0	0	6	3	0
Initiate	0	1	3	0	0
Manipulate	0	0	1	0	0
Modulate	0	4	5	8	0
Monitor	0	2	7	1	1
Organize	0	3	1	0	0
Plan	0	1	0	0	0
Retrieve	0	3	1	0	0
Shift	0	1	1	1	0
Stop/Interrupt	0	0	2	1	1
Sustain	0	2	3	3	0

MEFS Summary for unsuccessful students. Table 30 shows a summary of the distribution of the frequency of teacher item endorsements of "Sometimes" or "Often" for academically unsuccessful students by MEFS executive functions categories. Frequency counts of percentage of teachers endorsing items as occurring "Sometimes" or "Often" for academically unsuccessful students typically ranged from 70% to 100% for all of the BRIEF Scales. For some categories, however, all items were endorsed as occurring "Sometimes" or "Often" by 90% or more of teachers. These categories included the Anticipate, Generate, Initiate, Plan, Shift, and Stop/Interrupt categories.

Table 30

Summary of "Sometimes" or "Often" Item Endorsements by teachers for academically unsuccessful students by MEFS Categories

MEFS	Cumulative Frequency Ranges				
	90-100	80-89	70-79	60-69	<60
Anticipate	2	0	0	0	0
Balance	0	1	0	0	0
Correct	0	0	1	1	0
Estimate Time	1	1	0	0	0
Execute	0	2	0	0	0
Flexible	0	3	0	0	0
Generate	3	0	0	0	0
Hold Information	0	3	1	1	0
Inhibit	7	2	0	0	0
Initiate	4	0	0	0	0
Manipulate	0	1	0	0	0
Modulate	3	11	2	1	0
Monitor	5	6	0	0	0
Organize	3	1	0	0	0
Plan	1	0	0	0	0
Retrieve	1	2	1	0	0
Shift	2	0	1	0	0
Stop/Interrupt	3	0	1	0	0
Sustain	6	2	0	0	0

Question 4: When BRIEF items are reorganized using the McCloskey Model of Executive

Functions categories, which executive functions most effectively differentiated between

academically successful and academically unsuccessful students?

The fourth research question examined the frequency of the teacher item rating difference scores based on the McCloskey Model of Executive Functions to determine those executive functions which were considered most problematic for students. These frequencies, organized according to the six Clusters within the McCloskey Model of Executive Functions, are shown in Tables 31 through 37.

Teacher Item Rating Differences by MEFS Category within the Attention Cluster. Table

31 reflects the cumulative percentages of difference scores for teacher ratings of each item of the

Attention Cluster. Difference scores show that all of the items reflected high levels of teacher

ratings between academically successful and unsuccessful students.

Table 31

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS Attention Cluster

Attention Cluster Items	MEFS Category	BRIEF Scale	2+1	2	1	0	-1	-2
Has trouble concentrating on chores, schoolwork, etc.	SUSTAIN	WM	90	45	45	6	4	0
Has trouble finishing tasks	SUSTAIN	WM	89	58	31	9	2	0
Is easily distracted by noises, activity, sights, etc.	SUSTAIN	WM	88	43	45	9	3	0
Needs help from an adult to stay on task	SUSTAIN	WM	86	43	43	14	0	0
Has a short attention span	SUSTAIN	WM	85	42	43	12	3	0
Has good ideas but does not get the job done (lacks follow-through)	SUSTAIN	PLOR	77	25	52	20	3	0
Does not finish long-term projects	SUSTAIN	N/A	76	44	32	17	5	2
Cannot stay on the same topic when talking	SUSTAIN	N/A	75	35	40	20	5	0

Teacher Item Rating Differences by MEFS Category within the Engagement Cluster. The cumulative percentages of difference scores for teacher ratings of each item of the Engagement Cluster are displayed in Table 32. For this cluster, difference scores show that all of the items reflected high levels of teacher ratings between academically successful and unsuccessful students.   More specifically, 15 of 23 items reflected differences of greater than 75%.

Table 32

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS Engagement Cluster

Engagement Cluster Items	MEFS Cluster	BRIEF Scale	2+1	2	1	0	-1	-2
Blurts things out	INHIBIT	N/A	91	63	28	9	0	0
Needs to be told to begin a task even when willing	INITIATE	INITIATE	87	48	39	13	0	0
Gets in trouble if not supervised by an adult	INHIBIT	INHIBIT	86	45	41	9	5	0
Is not a self-starter	INITIATE	INITIATE	86	55	31	13	1	0
Has trouble getting started on homework or chores	INITIATE	INITIATE	86	52	34	12	2	0
Says the same thing over and over	SHIFT	N/A	86	55	31	11	1	2
Does not take initiative	INITIATE	INITIATE	83	37	46	14	3	0
Has trouble waiting for turn	INHIBIT	N/A	82	52	30	12	3	3
Has trouble putting the brakes on his/her actions	STOP/INT	INHIBIT	81	46	35	14	3	2
Is fidgety	INHIBIT	N/A	79	54	25	17	3	1
Interrupts others	INHIBIT	INHIBIT	78	55	23	17	3	2
Needs to be told to stop that	STOP/INT	INHIBIT	78	44	34	17	2	3
Is impulsive	INHIBIT	INHIBIT	77	57	20	17	3	3
Has trouble moving from one activity to another	SHIFT	N/A	77	34	43	17	5	1
Has to be closely supervised	INHIBIT	N/A	75	40	35	20	5	0
Resists or has trouble accepting a different way	FLEXIBLE	SHIFT	71	27	44	24	5	0

to solve a problem

Talks at the wrong time	INHIBIT	N/A	71	49	22	20	6	3
Does not think of consequences before acting	INHIBIT	INHIBIT	69	40	29	22	8	1
Thinks too much about the same topic	STOP/INT	SHIFT	68	19	49	26	6	0
Has trouble getting used to new situations (classes, groups, friends)	FLEXIBLE	SHIFT	67	22	45	27	6	0
Cannot get a disappointment, scolding, or insult off his/her mind	STOP/INT	SHIFT	62	5	57	35	3	0
Gets stuck on one topic or activity	SHIFT	SHIFT	61	25	36	29	8	2
Resists change of routines	FLEXIBLE	SHIFT	58	20	38	34	8	0

Teacher Item Rating Differences by MEFS Category within the Evaluation Cluster.

Difference scores for the Evaluate Cluster are reflected in Table 33. Teacher ratings for items

contained within this cluster demonstrate differences greater than 50% when rating unsuccessful

and successful students on these items.

Table 33

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS
Evaluation Cluster

Evaluation Cluster Items	MEFS	BRIEF	2+1	2	1	0	-1	-2
Leaves work incomplete	MONITOR	MON	92	60	32	6	2	0
Has poor understanding of own strengths and weaknesses	MONITOR	MON	85	45	40	12	3	0
Gets out of control more than friends	MODULATE	INHIBIT	83	49	34	12	3	2
Makes careless errors	MONITOR	MON	83	46	37	17	0	0
Becomes overwhelmed by large assignments	MODULATE	PLOR	82	43	39	17	1	0
Does not check work for mistakes	MONITOR	MON	82	50	32	15	3	0
Forgets to hand in homework, even when completed	MONITOR	PLOR	82	41	41	10	3	5
Work is sloppy	MONITOR	MON	80	40	40	17	3	0
Gets out of seat at wrong time	MONITOR	INHIBIT	79	51	28	19	1	1
Gets upset too easily	MODULATE	EMO	78	37	41	17	5	0
Acts too wild or out of control	MODULATE	INHIBIT	78	43	35	19	2	1
Is unaware of how his/her behavior affects or bothers others	MONITOR	MON	78	33	45	14	8	0
Reacts more strongly to situations than other children	MODULATE	EMO	75	41	34	20	5	0
Has outbursts for little reason	MODULATE	EMO	74	37	37	23	3	0

Mood is easily influenced by the situation	MODULATE	EMO	74	37	37	24	2	0
Does not realize that certain actions bother others	MONITOR	MON	74	39	35	20	6	0
Small events trigger big reactions	MODULATE	EMO	72	34	38	25	2	1
Talks or plays too loudly	MODULATE	MON	72	49	23	19	6	3
After having a problem, will stay disappointed for a long time	MODULATE	SHIFT	72	38	34	23	5	0
Is unaware of own behavior when in a group	MONITOR	MON	72	34	38	23	5	0
Gets caught up in details and misses the big picture	BALANCE	PLOR	71	25	46	28	1	0
Mood changes frequently	MODULATE	EMO	70	26	44	27	3	0
Overreacts to small problems	MODULATE	EMO	69	27	42	25	6	0
Does not notice when his/her behavior causes negative reactions	MONITOR	MON	69	41	28	28	3	0
Has explosive, angry outbursts	MODULATE	EMO	67	35	32	28	5	0
Leaves messes that others have to clean up	CORRECT	OMAT	66	35	31	31	3	0
Leaves a trail of belongings wherever he/she goes	CORRECT	OMAT	64	33	31	33	1	2
Becomes upset with new situations	MODULATE	SHIFT	64	23	41	28	8	0
Angry or tearful outbursts are intense but end easily	MODULATE	EMO	58	24	34	39	3	0
Is disturbed by a change of teacher or class	MODULATE	SHIFT	56	20	36	27	14	3

| Acts upset by a change in plans | MODULATE | SHIFT | 55 | 29 | 26 | 42 | 3 | 0 |

Teacher Item Rating Differences by MEFS Category within the Solution Cluster. Items composing the solution cluster and the difference scores obtained for teacher ratings of successful and unsuccessful students are shown in Table 34. Most items in this cluster reflect high levels of difference among teacher ratings.

Table 34

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS Solution Cluster

Items	MEFS	BRIEF	2+1	2	1	0	-1	-2
Does not plan ahead for assignments	PLAN	PLOR	91	59	32	9	0	0
Does not connect doing tonight's homework with grades	ANTICIPATE	N/A	90	57	33	8	2	0
Does not think before doing	ANTICIPATE	INHIBIT	88	45	43	11	1	0
Starts assignments or chores at the last minute	ESTTIME	PLOR	84	42	42	16	0	0
Does not show creativity in solving a problem	GENERATE	INITIATE	81	35	46	17	2	0
Has problems coming up with new ways of solving a problem	GENERATE	INITIATE	80	34	46	20	0	0
Has trouble thinking of a different way to solve a problem when stuck	GENERATE	INITIATE	79	40	39	21	0	0
Backpack is disorganized	ORGANIZE	OMAT	79	52	27	17	2	2
Underestimates time needed to finish tasks	ESTTIME	PLOR	78	36	42	17	3	2
Does not come prepared for class	ORGANIZE	N/A	71	49	22	20	6	3
Has a messy closet	ORGANIZE	OMAT	67	37	30	31	2	0
Written work is poorly organized	ORGANIZE	PLOR	65	2	63	20	14	1

Teacher Item Rating Differences by MEFS Category within the Efficiency Cluster. Table 35 shows the cumulative percentage of differences for items within the Efficiency Cluster. The two items composing this cluster showed high degrees of difference in teacher ratings of successful and unsuccessful students.

Table 35

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS
Efficiency Cluster

Efficiency Cluster Items	MEFS	BRIEF	2+1	2	1	0	-1	-2
Tests poorly even when knows correct answers	EXECUTE	N/A	78	35	43	20	2	0
Has poor handwriting	EXECUTE	N/A	76	44	32	17	5	2

Teacher Item Rating Differences by MEFS Category within the Recollection Cluster.

Ratings of differences between successful and unsuccessful students for those items

corresponding to the recollection cluster are shown in Table 36. Some of the items demonstrated

a high degree of difference between successful and unsuccessful students.

Table 36

Cumulative Percentages of Teacher Rating Item Differences by Category within the MEFS Recollection Cluster

Recollection Cluster Items	MEFS	BRIEF	2+1	2	1	0	-1	-2
Does not bring home, homework, assignment sheets, etc.	RETRIEVE	PLOR	91	63	28	9	0	0
Cannot find things at home	RETRIEVE	OMAT	79	31	48	14	5	2
When given three things to do, remembers only the first or last	HOLD	WM	75	30	45	19	6	0
Has trouble with chores or tasks that have more than one step	HOLD	WM	75	34	41	22	3	0
Cannot find things in room or school desk	RETRIEVE	OMAT	75	32	43	21	2	2
Forgets what he/she was doing	HOLD	WM	74	32	42	23	3	0
Has trouble remembering things, even for a few minutes	HOLD	WM	71	36	35	29	0	0
Loses things	RETRIEVE	OMAT	68	34	34	26	6	0
Has good ideas but cannot get them on paper	MANIPULATE	PLOR	64	26	38	31	5	0
When sent to get something, forgets what he/she is supposed to get	HOLD	WM	59	17	42	38	3	0

Summary of teacher rating item differences by MEFS category. Table 37 shows the frequency of the cumulative percentages of teachers' item ratings of successful and unsuccessful students that discriminated effectively; that is, they produced differences of +1 or +2 by MEFS category. Frequencies of percentages of teacher item ratings that discriminated effectively were highest for the Anticipate, Initiate, Plan and Sustain categories.

Table 37

Summary of Teacher Rating Item Differences by MEFS Category

MEFS Category	Cumulative Frequency Ranges				
	90-100	80-89	70-79	60-69	<60
Anticipate	1	1	0	0	0
Balance	0	0	1	0	0
Correct	0	0	0	2	0
Estimate Time	0	1	1	0	0
Execute	0	0	2	0	0
Flexible	0	0	1	1	1
Generate	0	2	1	0	0
Hold Information	0	0	4	0	1
Inhibit	1	2	5	1	0
Initiate	0	4	0	0	0
Manipulate	0	0	0	1	0
Modulate	0	2	9	3	3
Monitor	1	5	4	1	0
Organize	0	0	2	2	0
Plan	1	0	0	0	0
Retrieve	1	1	1	1	0
Shift	0	0	2	1	0
Stop/Interrupt	0	1	1	2	0
Sustain	0	5	3	0	0

Question 5: What were the items most frequently endorsed by teachers as most highly problematic for academically unsuccessful students?

The fifth research question investigated those 20 of the 86 items of the BRIEF which were rated to be most problematic for academically unsuccessful students. The most frequently endorsed items for the BRIEF for academically unsuccessful students are presented in Table 38. These items were rated as occurring "Sometimes" or "Often" for academically unsuccessful students by 95% or more of the teachers that provided the prototypical ratings.

Table 38

Top 20 items endorsed as "Sometimes" or "Often" for academically unsuccessful students

Items	MEFS	BRIEF	Frequency of S+O
Needs help from an adult to stay on task	SUSTAIN	WM	100
Makes careless errors	MONITOR	MON	100
Leaves work incomplete	MONITOR	MON	100
Needs to be told to begin a task even when willing	INITIATE	INITIATE	100
Is easily distracted by noises, activity, sights, etc.	SUSTAIN	WM	98
Does not bring home the homework, assignment sheets, etc.	RETRIEVE	PLOR	98
Does not plan ahead for assignments	PLAN	PLOR	98
Has a short attention span	SUSTAIN	WM	97
Has problems coming up with new ways of solving a problem	GENERATE	INITIATE	97
Does not think before doing	ANTICIPATE	INHIBIT	97
Does not finish long-term project	SUSTAIN	N/A	95
Has trouble finishing tasks	SUSTAIN	WM	95
Does not come prepared for class	ORGANIZE	N/A	95
Does not check work for mistakes	MONITOR	MON	95
Is not a self-starter	INITIATE	INITIATE	95
Has trouble waiting for turn	INHIBIT	N/A	95
Is Fidgety	INHIBIT	N/A	95
Does not show creativity in solving a problem	GENERATE	INITIATE	95
Has trouble thinking of a different way to solve a problem when stuck	GENERATE	INITIATE	95
Does not connect doing tonight's homework with grades	ANTICIPATE	N/A	95

Question 6: What were the items most frequently endorsed by teachers as never problematic for academically successful students?

The sixth research question investigated those items of the BRIEF which were endorsed as "Never" problematic for academically successful students. Teacher ratings of the top 10 items that were rated never to be problematic for academically successful students are presented in Table 39. Three of the top 10 items are not included on any of the BRIEF Scales and are considered extra items.

Table 39

Items that were most frequently (>80%) endorsed as "Never" occurring by teachers of academically successful students.

Item	MEFS	BRIEF	Never
Leaves a trail of belongings whenever he/she goes	CORRECT	OMAT	91
Has trouble remembering things, even for a few minutes	HOLD	WM	89
Says the same thing over and over	SHIFT	N/A	89
Does not connect doing tonight's homework with grades	ANTICIPATE	N/A	87
Written work is poorly organized	ORGANIZE	PLOR	87
When sent to get something, forgets what he/she is supposed to get	HOLD	WM	86
Angry or tearful outbursts are intense but end easily	MODULATE	EMO	86
Work is sloppy	MONITOR	MON	85
Does not finish long-term project	SUSTAIN	N/A	85
Cannot find things at home	RETRIEVE	OMAT	84

Question 7: What items most frequently discriminated most effectively between academically successful students and academically unsuccessful students?

Table 40

Items that discriminated most effectively between academically successful students and academically unsuccessful students

Items	MEFS	BRIEF	Frequency +2 0r +1 Discrimination Values
Leaves work incomplete	MONITOR	MONITOR	92
Does not plan ahead for assignments	PLAN	PLOR	91
Does not bring home the homework, assignment sheets, etc.	RETRIEVE	PLOR	91
Blurts things out	INHIBIT	N/A	91
Has trouble concentrating on chores, homework, etc.	SUSTAIN	WM	90
Does not connect doing tonight's homework with grades	ANTICIPATE	N/A	90
Has trouble finishing tasks	SUSTAIN	WM	89
Is easily distracted by noises, activity, sights, etc.	SUSTAIN	WM	88
Does not think before doing	ANTICIPATE	INHIBIT	88
Needs to be told to begin a task even when willing	INITIATE	INITIATE	87
Is not a self-starter	INITIATE	INITIATE	86
Has trouble getting started on homework or chores	INITIATE	INITIATE	86
Needs help to stay on task	SUSTAIN	WM	86
Gets in trouble if not supervised by an adult	INHIBIT	INHIBIT	86
Says the same thing over and over.	SHIFT	N/A	86
Has a poor understanding of own strengths and weaknesses	MONITOR	MONITOR	85
Has a short attention span	SUSTAIN	WM	85
Starts assignments and chores at the last minute	ESTIMATE TIME	PLOR	84

Makes careless errors	MONITOR	MONITOR	83
Does not take initiative	INITIATE	INITIATE	83

Chapter 4

Discussion

The purpose of this study was to utilize archival data collected, using the Behavior Rating Inventory of Executive Functions (BRIEF) to examine teacher ratings of prototypically academically successful and prototypically academically unsuccessful students at the item level. Previous research has examined the data at the scale level (Bobik, 2008). However, item level analysis was completed to further enhance the knowledge base related to specific behaviors reflecting executive functions difficulties that are most frequently associated with a lack of student achievement. The following research questions were examined.

Research Questions

1. Which specific items of the Behavior Rating Inventory of Executive Function (BRIEF) were most frequently endorsed for academically successful and academically unsuccessful students?

Frequency counts of percentage of teachers endorsing items as occurring "Never" for academically successful students typically ranged from 60% to 89% for all of the items of all of the BRIEF Scales. A total of 26 of the 85 BRIEF items were endorsed as "Never" occurring for academically successful students by 80% or more of teachers. The highest concentration of these items (7) came from the pool of extra items that were not included on any specific BRIEF scale. The Organization of Materials Scale was second highest with 5 items endorsed as "Never" occurring by 80% or more of the teachers. The Working Memory Scale had 4 items in this category, followed by the Emotional Control and Plan/Organize Scales with 3 each and the Inhibit Scale with 2. The Initiate and Inhibit Scales contributed only 1 item each to this group and the Shift Scale provided no items that were endorsed as "Never" occurring by 80% or more of the teachers who rated prototypically academically successful students.

Frequency counts of percentage of teachers endorsing items as occurring "Sometimes" or "Often" for academically unsuccessful students typically ranged from 70% to 100% for all of the items of all of the BRIEF Scales.   A total of 76 of the 85 BRIEF items were endorsed as "Sometimes" or "Often" occurring for academically unsuccessful students by 80% or more of teachers. The highest concentration of these items (12) came from the pool of extra items that were not included on any specific BRIEF scale. All of the Monitor, Plan/Organize and Inhibit Scales were second highest with 10 items each endorsed as "Sometimes" or "Often" occurring for academically unsuccessful students by 80% or more of the teachers. The Working Memory and Emotional Control Scales provided 8 items each to this category, followed by the Initiate Scale with 7 and the Shift Scale with 6. The Organization of Materials Scale provided the fewest items (5) to the pool of items that were endorsed as "Sometimes" or "Often" occurring by 80% or more of the teachers who rated prototypically academically unsuccessful students.

2. To what extent do the items of the BRIEF differentiate successful versus unsuccessful students, based on teacher ratings?

Frequencies of percentages of the differences between each teacher's ratings of academically unsuccessful and academically successful students were provided for each item of the BRIEF. The percentage of teachers whose item ratings effectively discriminated between academically unsuccessful and academically successful students varied greatly by individual item with the percentage of teacher ratings that discriminated effectively as low as 55% for some items and as high as 91% for other items. The percentage of teachers whose item ratings effectively discriminated between academically unsuccessful and academically successful students was 80% or more for 29 of the 85 BRIEF items. These items were distributed relatively evenly across five of the 8 BRIEF Scales and the extra item pool. The Initiate Scale provided the

greatest number of items (6) endorsed by high percentages of teachers as discriminating effectively between academically unsuccessful students and academically successful students. The Monitor, Plan/Organize, and Working Memory Scales were tied for second, with 5 items each and the Inhibit Scales and the extra item pool each provided 4 items to this group. The Emotional Control, Organization of Materials and Shift Scales did not provide any items for which 80% or more of teachers' item ratings effectively discriminated between academically unsuccessful students and academically successful students.

3. When BRIEF items are reorganized using the McCloskey Model of Executive Functions, which executive functions are most frequently endorsed as problematic for academically successful and academically unsuccessful students?

Because the same item pool is used for this analysis, the frequency of occurrence of teacher ratings remained the same as in Question 1, with frequency counts of the percentage of teachers endorsing items as occurring "Never" for academically successful students typically ranging from 60% to 89%. When the 85 items of the BRIEF were redistributed according to MEFS Executive Functions Categories, the 26 items that were endorsed as "Never" occurring for academically successful students by 80% or more of the teachers were distributed across 13 of the 19 MEFS Categories. The largest number of items endorsed as "Never" by 80% or more of the teachers came from the Modulate and Hold Information Categories, with 4 from each. The Organize and Retrieve Categories each provided 3 items and the Generate, Monitor and Sustain Categories contributed 2 items each. The Anticipate, Correct, Estimate Time, Initiate, Plan, and Shift Categories provided 1 item each. No items from the Balance, Flexible, Generate, Inhibit, Manipulate, and Stop/Interrupt Categories were rated as occurring "Never" for academically successful students by 80% or more of the teachers.

As noted in the findings from Question 1, frequency counts of the percentage of teachers endorsing items as occurring "Sometimes" or "Often" for academically unsuccessful students typically ranged from 70% to 100% for all of the items.   When the 85 items of the BRIEF were redistributed according to MEFS Executive Functions Categories, the 76 items that were endorsed as "Sometimes" or "Often" occurring for academically unsuccessful students by 80% or more of the teachers were distributed across 18 of the 19 MEFS Categories represented by items of the BRIEF. The largest number of items endorsed as "Sometimes" or "Often" by 80% or more of the teachers came from the Modulate Category (14). The second highest number of items was found in the Monitor Category with 11, closely followed by the Inhibit Category with 9 and the Sustain Category with 8. The Initiate and Organize Categories each contained 4 items frequently rated as "Sometimes" or "Often"; the Hold Information, Retrieve, Flexible, Generate, and Stop/Interrupt Categories each contained 3 items frequently rated as "Sometimes" or "Often" and the Anticipate, Estimate Time and Shift Categories each contained 2 items frequently rated as "Sometimes" or "Often." The Plan, Balance, and Manipulate Categories contained only 1 item each and the Correct Category contained no items rated as occurring "Sometimes" or "Often" for academically unsuccessful students by 80% or more of the teachers.

4. When BRIEF items are reorganized using the McCloskey Model of Executive Functions, which executive functions most effectively differentiate between academically successful and academically unsuccessful students?

Frequencies of percentages of the differences between each teacher's ratings of academically unsuccessful and academically successful students provided for each item of the BRIEF were reorganized according to the MEFS Executive Functions Categories. As noted in the findings from Question 2, the percentage of teachers whose item ratings effectively

discriminated between academically unsuccessful and academically successful students was 80%

or more for 29 of the 85 BRIEF items. When the 85 items of the BRIEF were redistributed

according to MEFS Executive Functions Categories, the 29 items that discriminated effectively

between academically unsuccessful students and academically successful students for 80% or

more of the teachers were distributed across 11 of the 19 MEFS Categories.

The Monitor Category contained the largest number of items (6) that discriminated

effectively between academically unsuccessful students and academically successful students for

80% or more of the teachers, The Sustain Category contained the second largest number of items

with 5, closely followed by the Initiate Category with 4. The Inhibit Category contained 3 items

that discriminated effectively for a large percentage of teachers and the Anticipate, Generate,

Modulate, and Retrieve Categories containing 2 items each. The Estimate Time, Plan, and

Stop/Interrupt Categories provided 1 item each. No items from the Balance, Correct, Execute,

Flexible, Hold Information, Manipulate, Organize and Shift Categories discriminated effectively

for 80% or more of the teachers.

5. What items were most frequently endorsed by teachers as problematic for academically

unsuccessful students?

A total of 20 items were almost universally endorsed by teachers as occurring

"Sometimes" or "Often" by academically unsuccessful students; i.e. they were endorsed by 95%

or more of all teachers that provided prototypical ratings. Based on the items most frequently

endorsed as problematic for academically unsuccessful students, a profile emerges that reflects

the following behaviors indicative of executive function difficulties; these include failing to

maintain and sustain attention to task and difficulty completing tasks independently; committing

careless errors, poor self-correcting and poor monitoring; struggling with inhibiting impulsive responses; forgetting items necessary for learning; struggling to initiate tasks; difficulties with problem solving, and planning ahead and difficulties with realizing cause and effect relationships regarding their own behaviors. This constellation of behaviors has been associated with learning disabilities, autism, and underachieving gifted populations (Kenney, 2010; Rogers, 2009).

Twenty-five percent of the most frequently endorsed items were from the MEFS Sustain Category. Four of these items are part of the BRIEF Working Memory Scale and the other is part of the BRIEF extra item pool.   Another 25% of the most frequently endorsed items are part of the BRIEF Initiate Scale, with 2 of these categorized as Initiate items and the other 3 categorized as Generate items using the MEFS categories. Three of the most frequently endorsed items represented difficulties with Monitoring and came from the BRIEF Monitor Scale and were also classified as Monitor items using the MEFS categories. Only one of the BRIEF Inhibit Scale items was included in the most frequently endorsed items, but the MEFS classification system suggests that this item is more representative of the executive function of Anticipate than of Inhibit. Conversely, two of the most frequently endorsed items that are classified as representing problems with Inhibition using the MEFS categorization were part of the extra item pool on the BRIEF. The remaining 4 items were categorized as Plan, Organize, Retrieve, and Anticipate, using the MEFS Categories. The Retrieve and Plan items came from the BRIEF Plan/Organize Scale and the Organize and Anticipate items came from the BRIEF extra item pool.

6. What were the most frequently endorsed items by teachers as being "Never" problematic for academically successful students?

Only 10 of the 85 BRIEF items were endorsed by 80 percent or more of all teachers as occurring "Never" for academically unsuccessful students. Three of these items were from the pool of items not assigned to a specific BRIEF Scale. Two of the items were from the Organization of Materials Scale and 2 were from the Working Memory Scale.   One of each of the remaining three items came from the Plan/Organize Scale, the Monitor Scale and the Emotional Control Scale.

Using the MEFS to classify these 10 most frequently endorsed items produced an even broader scattering across 9 different categories. Only the Hold category was represented with two items. The remaining eight categories had one item each: Correct, Anticipate, Shift, Organize, Modulate, Monitor, Sustain, and Retrieve.

7. What items most frequently discriminated most effectively between academically successful students and academically unsuccessful students?

Analysis of the 20 items that most frequently discriminated between academically successful and academically unsuccessful students revealed that these items were distributed across 5 of the 8 BRIEF Scales and the extra item pool and were distributed across 9 MEFS categories. Of these 20 items, the MEFS category assignments were consistent with the BRIEF Scale placements for nine of the twenty items (i.e., those items representing the executive functions of Monitor, Plan, Initiate, and Inhibit).   The BRIEF Scales most frequently represented were the Working Memory (5 items), Initiate (4 items), Plan/Organize (3 items), and the extra item pool (3 items). The MEFS Categories most frequently represented were the Sustain (5 items), Initiate (4 items), and Monitor (3 items) categories. The items that discriminated effectively for more than 90% of the teachers addressed behaviors that included:

leaving work incomplete, lack of planning for assignments, blurting things out, trouble concentrating, and lack of connecting homework with grades.

Discussion of Findings

Summary of Results

The results of this study provide an understanding of those behavior problems, reflecting executive functions difficulties that a group of teachers believe to be the biggest stumbling blocks to academic success. Interestingly, although there are 86 items on the BRIEF, results of the current study suggested that not all of the items are perceived as being equally important in relation to academic success. It was clear that some items were much more highly valued as per teacher endorsement. Each of the BRIEF scales appears to offer some items that reflected behaviors that teachers perceive to be associated with academic success. Although the results did not suggest a clear pattern whereby any specific executive functions were clearly superior to the others in being related to success, some were clearly less often associated with academic success than others. The BRIEF Scales least associated with academic success for the group of teachers in this study included the Organization of Materials, Shift, and Emotional Control Scales. What was clear from the results is that not all of the items within a BRIEF Scale or MEFS Category were found to be equally effective in identifying problems behaviors most closely associated with lack of academic success or problem behaviors least associated with academic success, or differentiating effectively between academically successful and academically unsuccessful students.

When examining the data, it was clear that the items most closely associated with a lack of academic success come from multiple BRIEF scales or multiple MEFS categories. The results do not show that any one Scale or Category is superior to the others as a source of these

items. However, given the findings, some BRIEF Scales or MEFS categories are much poorer

than the others in relation to teacher ratings of academic success. Similarly, when examining the

data to determine which items differentiated most effectively between successful and

unsuccessful students, there was no clear Scale or Category which was superior to the others.

Given the findings of the present study indicating that no single executive function

category or group of executive functions is most strongly related to academic success, but rather

that a broad array of executive functions are associated with academic success, it appears that

delineating executive functions across 32 skill descriptors as in the MEFS system versus the

eight described on the BRIEF may provide a more accurate view of academically successful

versus academically unsuccessful students' executive functions. Re-organizing and re-naming

the subscales according to the McCloskey Executive Function System may provide more specific

descriptors relating to each item, as opposed to the more global encapsulation of items

representing different executive functions within only eight scales. Further, using the MEFS

categories may be advantageous because they may be more descriptive of the specific executive

function problems represented by individual items than are the BRIEF Scale labels. Given that

the BRIEF descriptors are more global in nature, one may not be able to identify and target

intervention in a more specific manner to plan most successfully for intervention. For example,

when determining the items most frequently endorsed by teachers as "Never" occurring for

academically successful students, the BRIEF categories included organization of materials,

working memory, monitor, emotional control, plan/organize, and items not included on any

scales. When categorizing these same items using the MEFS structure, a majority of teacher

ratings indicate that the prototypically academically successful students do not demonstrate

difficulties with anticipating outcomes, correcting their errors, holding information for a short

period of time in memory, organizing their work, modulating their emotions, monitoring the quality of their work, sustaining attention to task, or retrieving information related to location of personal items. The MEFS perspective appears to lend itself to determining a specific pattern of strengths or weaknesses that can lead more readily to specific goal development and intervention planning. With the more global BRIEF descriptors, specific, targeted goal development and intervention would appear to be a more daunting task.

Along similar lines, analysis of the individual items of the BRIEF using the MEFS categories reveals some interesting overlaps and combinations of different executive functions embedded within the various BRIEF Scales. For example, applying the MEFS structure to the 8 items of the Inhibit Scale suggests that this Scale is composed not of 8 items that characterize difficulties with inhibition, but rather is composed of 4 items describing inhibition difficulties; 2 items describing modulation difficulties; 2 items describing difficulties with stopping or interrupting; 1 item describing anticipation difficulties, and 1 item describing difficulties with monitoring.

Results of this study suggest that when interpreting teacher ratings of the executive functions difficulties of academically unsuccessful students using the BRIEF, it is best to do an item analysis to identify specific items endorsed as occurring often rather than relying on the BRIEF Scale scores to identify areas of difficulty. More specifically, as mentioned previously, findings of this study did not suggest that any particular scale of the BRIEF was more effective than others at differentiating academically successful from academically unsuccessful students in terms of executive functions difficulties. This may suggest that it would behoove clinicians to identify the individual items that are rated as most problematic for an individual client. By focusing on individual items, clinicians may have a more comprehensive view of a student's

executive functions strengths and weaknesses. This will enable them to tailor a more

comprehensive assessment approach based upon item level results in order to test their

hypotheses related to a student's functioning and subsequently plan appropriate interventions to

address the specific areas of deficit. Furthermore, individual item results could be used in

progress monitoring efforts as a means to determine the efficacy of intervention to address the

student's executive functions weaknesses.

Implications of the Findings

The findings of this study lend support to the hypothesis that academically unsuccessful

students demonstrate a number of behaviors that are indicative of executive function difficulties

and that academically successful student exhibit very few behaviors that are indicative of

executive function difficulties. Given the disparities among the developmental progression and

maturation of the frontal lobe, specifically during adolescence, interventions designed to

accommodate the needs of academically unsuccessful students (i.e., dealing with problem

solving, lack of organization, and poor self-monitoring, etc.) may be addressed most successfully

through systematic instruction. In schools there is often a failure in schools to address the

executive functions difficulties of academically unsuccessful students. Students in middle and

high school are "expected" to effectively avoid the executive function difficulties that teachers in

this study associated most closely with academic failure. Conversely, it is not mainstream

practice to offer specific interventions or systematic instruction for general education

populations, potentially doing a disservice to those students that may very well possess the

academic skill set to master the curriculum but fall short on the "producing" end (Denckla, 2009)

because of executive function difficulties.

Limitations of the Study

Given the limited sample size and restriction of data collection to a single school district, a possible lack of generalizability of the findings is a major limitation of the study. Further, given the limited number of categories proposed for identifying specific areas of executive dysfunction with the BRIEF, items corresponding to a broader array of executive functions were not always available in order to examine, effectively, the full range of executive functions proposed in the McCloskey model of executive functions.

Another limitation of this study relates to the wording of the BRIEF items. Almost all of the items are worded in a negative manner, limiting the ability to utilize the items as a means of forming specific goals for intervention. The scale is focused solely on problems; therefore, it is challenging to identify what the child does well in regard to executive functions. This may cause difficulties with interpretation as one is left to ponder if the child actually can perform the actions or if he or she is simply "never a problem" based upon the ratings.

Finally, a limitation of the study and the use of the BRIEF surround the eight global categories outlined. Only 19 of the 32 McCloskey scales were addressed when the results were examined. This omits 13 executive function capacities if interpreting a child's functioning solely, using the BRIEF. These functions may be more closely related to academic success because they include: sense/time, pace, etc. Given the omission of these functions, one may be left with an incomplete picture of a student's use of executive capacities.

Future Directions for Research

Researchers have paid insufficient attention to executive functions among the general population. Therefore, future studies that attempt to provide a greater understanding of the

relationship between executive function and non-clinical constructs, such as those inherent in academic self-regulation may enhance the understanding of typical executive functions (Garner, 2009).

Additionally, the current study focused on prototypical ratings of academically successful and academically unsuccessful students and did not address teacher perceptions of the executive function difficulties associated with behavior or emotional problems as they are manifested in the school setting. Future studies could collect and analyze data on teacher prototypical ratings of students who are well behaved or who appear to be free of emotional difficulties, in contrast to prototypical ratings of students who exhibit behavior problems in school or who appear to have emotional difficulties.

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